2013

Determining garnet crystallization kinetics from growth zoning and Mn-calibrated Sm-Nd ages

Rose Bloom
Western Washington University

Determining Garnet Crystallization Kinetics from Growth Zoning and Mn-Calibrated Sm-Nd Ages

By
Rose Bloom

Accepted in Partial Completion
Of the Requirements for the Degree
Master of Science

Kathleen L. Kitto, Dean of the Graduate School

ADVISORY COMMITTEE

Chair, Dr. David Hirsch

Dr. Pete Stelling

Dr. Ethan Baxter

MASTER'S THESIS

In presenting this thesis in partial fulfillment of the requirements for a master's degree at Western Washington University, I grant to Western Washington University the non-exclusive royalty-free right to archive, reproduce, distribute, and display the thesis in any and all forms, including electronic format, via any digital library mechanisms maintained by WWU.

I represent and warrant this is my original work, and does not infringe or violate any rights of others. I warrant that I have obtained permissions from the owner of any third party copyrighted material included in these files.

I acknowledge that I retain ownership rights to the copyright of this work, including but not limited to the right to use all or part of this work in future works, such as articles or books.

Library users are granted permission for individual, research and non-commercial reproduction of this work for educational purposes only. Any further digital posting of this document require specific permission from the author.

Any copying or publication of this thesis for commercial purposes, or for financial gain, is not allowed without my written permission.

Rose Bloom
November 14, 2013

Determining Garnet Crystallization Kinetics from Growth Zoning and Mn-Calibrated Sm-Nd Ages

A Thesis
Presented to
The Faculty of
Western Washington University

In Partial Fulfillment
Of the Requirements for the Degree
Master of Science

By
Rose Bloom
November 2013

Abstract

By working under the assumption that garnet strongly fractionates Mn, the change in measured X_{Mn} from the core to rim of a garnet can be used to represent the progression of time since nucleation. Core, mantle, and rim zones from nine snowball garnets collected at the Pinney Hollow Formation, Townshend Dam, VT were analyzed using electron probe microanalysis (EPMA) as well as Sm/Nd isotopic methods. Two-point garnet-matrix Sm/Nd ages are complex, with some showing apparent reverse age zoning and unrealistically young ages. Therefore, some garnet ages were culled, including those with poor $^{147}Sm/^{144}Nd$ ratios (< 0.75), low Nd concentrations (> 0.2 ppm), and rim ages that pre-date core ages. The remaining nineteen Sm/Nd ages show a 10.0 ± 3.5 Myr garnet growth duration with the oldest garnet core age being 383.3 ± 3.3 Ma, and the youngest rim age being 373.3 ± 1.3 Ma. Using the isotopic ages along with their corresponding Mn data, an association between Mn and time was developed for the entire sample. This relationship was calculated to be Age = 2 x 10^1 (+16/-6) Ma (X_{Mn}) + 379.3 ± 0.1 Ma.

Because the nine dated garnets came from a very large sample (TD0914a), a subvolume was extracted for kinetics work. The kinetics subvolume measured 3940 cm^3, and was disaggregated to collect every garnet porphyroblast from within. Each subvolume garnet was cut through the morphological center and analyzed for Mn content using EPMA. By referring each EPMA Mn datum to the Mn-age equation, 5,500 points from 78 garnets were indirectly dated. These garnets grew over 4.9 ± 2.7 Myr and nucleated over a 4.7 ± 2.6 Myr duration. The nucleation rate for the sample is 0.005 ± 0.002 nuclei/cm^3/Myr or approximately one nucleation event per cubic centimeter per 200 Myr. Incremental growth rates were calculated for each of the 78 subvolume garnets, and are provided as growth rate (mm/Myr) versus distance from the core (mm). Much growth rate variation occurs throughout the entirety of the subvolume as well as within each garnet. However, due to EPMA noise in Mn content coupled with closely spaced analysis points, some incremental growth rates are unreasonably large or small (-500 to 500 mm/Myr). EPMA data that produce such extreme values were culled, leaving more reasonable rates.

Garnets in the sample show competition for nutrients during growth. Garnets that nucleated near other nuclei early in the crystallization episode showed stunted growth compared to those that nucleated in an isolated location. Though some retrogression textures were observed in the subvolume samples, this project provides a novel and robust natural kinetic dataset from which future research may be conducted.

Acknowlegements

This thesis could not have been completed without the help and support from a large cast. First of all, I would like to thank my advisor, Dr. Dave Hirsch, for offering me the opportunity to work on such a fantastic project. Thanks to my committee, Dr. Pete Stelling and Dr. Ethan Baxter for providing helpful feedback. A hearty thank you to everyone on this NSF project: Dr. Ethan Baxter, Dr. Harold Stowell, Dr. Besim Dragovic, and Dr. Matthew Gatewood. The Sm/Nd dataset was provided by the aforementioned researchers, and I would not have had a project if they had not done such an outstanding job.

For those who offered an immeasurable amount of support without which this thesis would not exist: Dr. Mati Raudsepp and Edith Czech at the UBC Microprobe facility; George Mustoe (of course); Erin Macri at the WWU SEM facility; Sarah Faubion, Alicia Fisher, and Elena Chapman who helped me get a lot of work done, and finally, Chris Sutton for provided the necessary departmental support.

Table of Contents

List of Figures

List of Tables

Introduction

Essential to an understanding of metamorphic rocks is the rate at which a metamorphic reaction occurs. Without a strong understanding of the controls on kinetics, the rates at which any reaction can occur, we can only speculate the details of metamorphic rock formation. The primary components of crystallization kinetics are the rates of porphyroblast growth and nucleation. Previous studies have been able to quantify porphyroblast growth durations and thus time-averaged crystallization rates through isotopic analysis (Christensen et al., 1989), but until recently nucleation kinetics have remained enigmatic. To date, forward modeling based on porphyroblast distribution has been the most successful way to estimate the nucleation rate of a specimen (Carlson, 1989; Carlson and Ketcham, 2005). However, as of yet, the pilot study of Wright (2010) stands as the only study to quantify natural nucleation rates, and with serious limitations.

The purpose of this project is to refine the methods proposed by Wright (2010) of collecting data on garnet nucleation and growth rates based on the relationship between Mn content and Sm-Nd crystallization age. The previously established methods were applied to a much larger dataset than Wright (2010), making this the first large collection of instantaneous (versus time-averaged) measurements of garnet growth and nucleation rates. Collaborators who did the isotopic dating in this project are Dr Ethan Baxter and Besim Dragovic at Boston University (BU) and Dr. Harold Stowell and Matthew Gatewood at University of Alabama (UA).

Background and Previous Work

Garnet Growth

Many have used garnet to ascertain information about tectonism and metamorphism (e.g., Spear and Selverstone, 1983). Garnet is especially useful for this project because it has a slow intracrystalline diffusion rate (Yardley, 1977). This slow diffusion rate allows garnet to form concentric chemical zones that preserve information about the metamorphic history of the rock. The core of the porphyroblast contains the chemistry of garnet in equilibrium with the surrounding matrix at the time of nucleation. As crystallization progresses, the matrix becomes depleted in those elements more compatible in garnet (and other products forming at the same time). The composition of the garnet adapts due to the changes in available elements, and a slow intracrystalline diffusion rate causes the garnet to "lock in" the composition of that which formed earlier. Therefore, the core of the garnet represents the earliest record of the growth history, while the rim represents the end of garnet growth.

Manganese is one element that demonstrates garnet's slow intracrystalline diffusion well. This element is highly compatible with garnet relative to most other silicates. As garnet grows, it preferentially incorporates Mn, depleting the matrix thereof (Hollister, 1966). As Mn is depleted in the matrix, later garnet has less Mn available for it to incorporate, producing a Mn-rich core tapering to a Mn-poor rim; this is referred to as "Rayleigh depletion" by Hollister (1966). If the core-to-rim Mn content is linked by a smoothly decreasing trend, bell-shaped in form (Fig. 1), it is deemed "growth zoning." This zoning is inferred to result from the Rayleigh depletion process referenced above.

Metamorphic Nucleation and Growth Kinetics

The crystallization of minerals during metamorphism is governed by five processes: 1) the addition of heat (for most prograde reactions), 2) dissolution of reactant phases, 3) nucleation of the product phases, 4) transport of the dissolved components from the reactant phases into the intergranular medium and to the surface of the new crystal (diffusion), and 5) growth of the crystal by the removal of components from the intergranular medium (precipitation) (Carlson, 2010). When considering the formation of an individual porphyroblast, these five processes should occur more or less in order. However, when considering the rock as a whole, all of the processes will be occurring at the same time at different locations, creating competition among them.

Once nucleation begins in the rock, growth and nucleation work in parallel as a means to lower the reaction affinity. For example, if nucleation rates were slow, most of the crystallization would be accommodated by growth of existing crystals, and the rock would have few large crystals. There are three of the above processes that may limit the rate of crystal growth within a rock: heat flow, diffusion, and precipitation. Though heat flow is necessary for metamorphic reaction, most workers do not consider it as potentially the slowest process. Thus, diffusion and precipitation rates act as the principal rate-limiting factors in kinetics studies (Carlson, 2010).

Intergranular diffusional transport is controlled by the rate of movement of materials from the reactant minerals through the intergranular medium to the porphyroblast surface. If the reactant can dissolve, and the product (porphyroblast) can precipitate new material faster than the elements can diffuse to the site, then diffusion is the rate-limiting process. Diffusion-controlled growth causes the porphyroblast to create a depletion halo, a zone with diminished elements necessary for growth surrounding the porphyroblast. Because the depletion halo does not contain the elements necessary for porphyroblast formation in sufficient abundance to nucleate new product, nucleation of

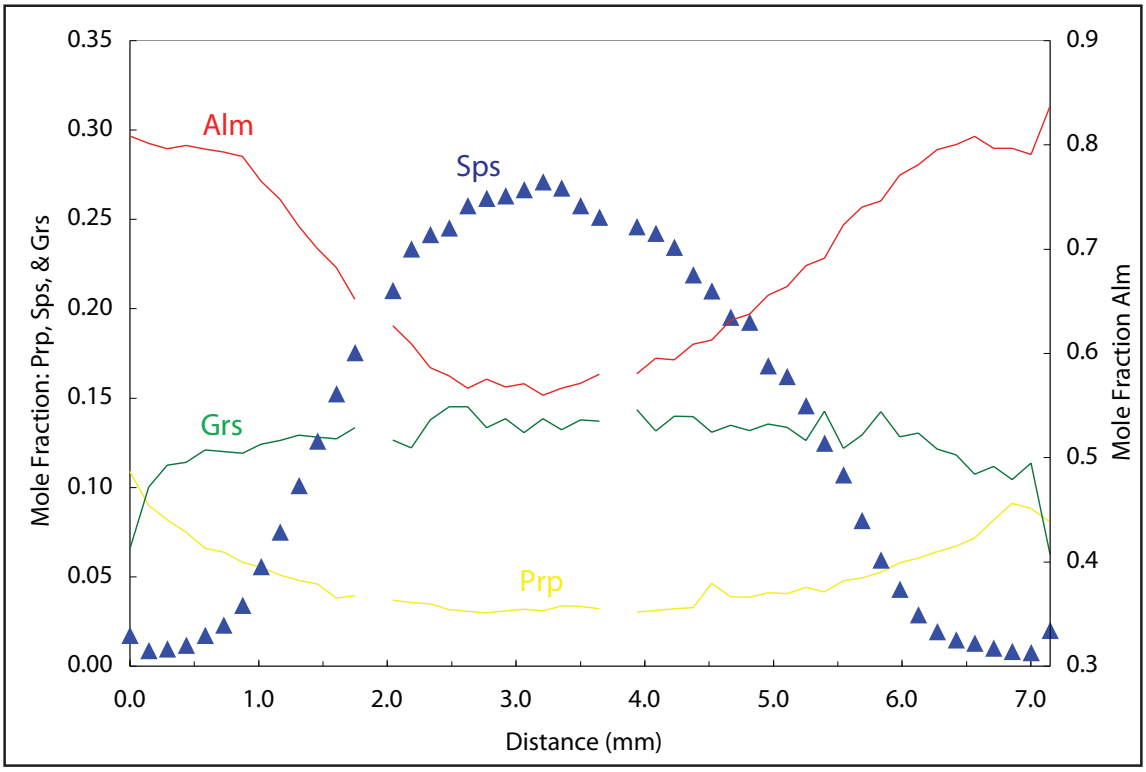


Figure 1. Garnet composition profile collected using EPMA. Sps represents Mn content. This profile shows a smooth bell-shaped curve with highest Mn concentration at the core, grading down to lowest Mn concentration at the rim. From Hirsch, Stowell, and Baxter's NSF proposal (2009).

new product porphyroblasts is suppressed in that area (Fig. 2a). Diffusion as the rate-limiting factor for crystallization means that the nucleation sites will have a characteristic separation distance where the depletion halo does not reach; therefore, systems controlled by diffusion tend toward statistical ordering. Also, if the depletion halos of two porphyroblasts impinge on one another, their growth will be hindered, regardless of the timing of the nucleation event (Fig. 2b).

In contrast to diffusion-controlled crystallization, if the diffusion of elements is faster than the porphyroblast's ability to attach the elements to its structure, then precipitation is rate-limiting (also known as interface-controlled crystallization). When precipitation is the rate-limiting factor, there is no depletion halo, and therefore nucleation may occur anywhere except within a previously nucleated porphyroblast (Fig. 2c). In a sample with precipitation control, the porphyroblasts that nucleated at the same time will be equal in size regardless of their proximity (Fig. 2d). Precipitation control will show a significantly reduced degree of statistical ordering, induced only by the inability to nucleate within the volume of an existing porphyroblast. This characteristic distinguishes precipitation-controlled from diffusion-controlled cases.

Townshend Dam Regional Geology

The rocks in this study come from the 400-meter spillway in the Townshend Dam region of VT, and have been well characterized by previous studies. The abundant research on the region lays a strong geologic framework and offers constraints for a new method such as this. Paramount previous studies include structural and tectonic (Doll et al., 1961; Rosenfeld, 1970), as well as petrologic (e.g. Karabinos, 1984; Kohn and Spear, 1990) and isotopic analyses (e.g. Christensen et al., 1989; Chamberlain and Conrad, 1993; Kohn and Valley, 1998).

There are four major formations in the Townshend Dam area (Fig. 3). The sample on which this research focuses, TD0914a, comes from a garnet-bearing

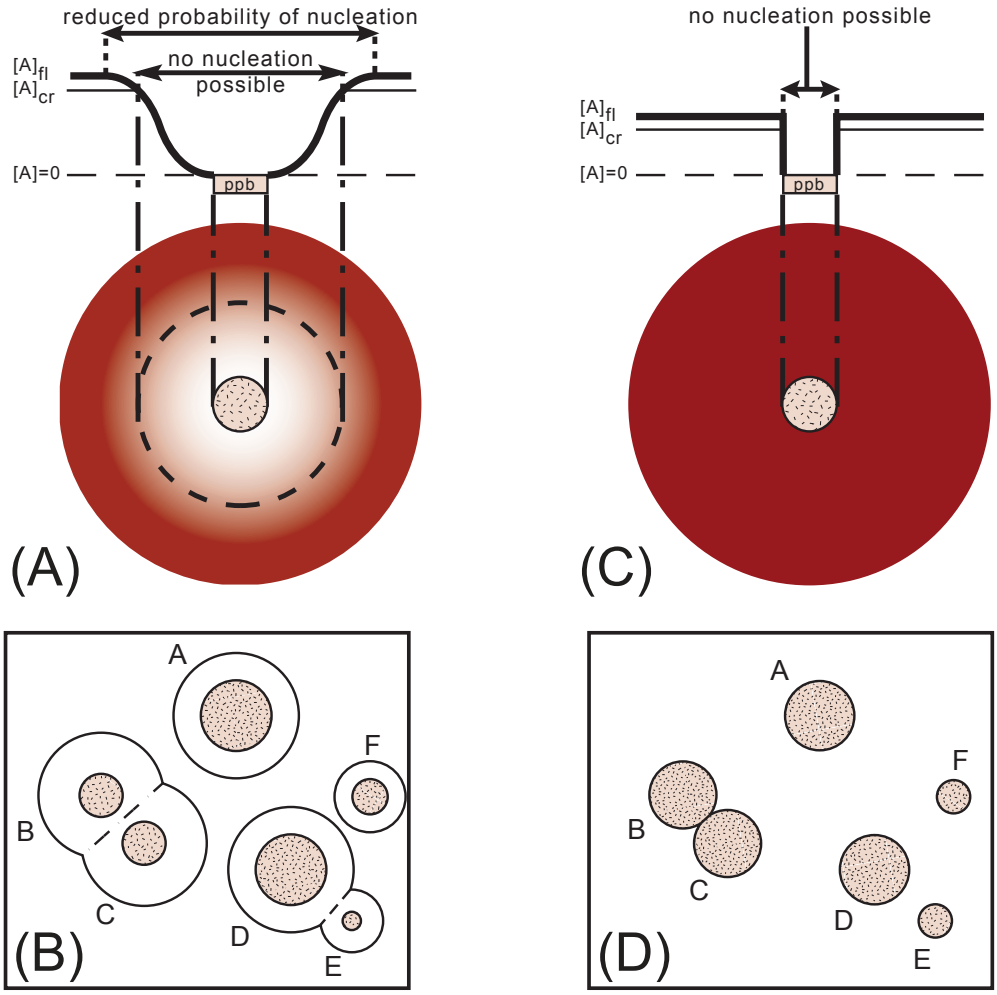


Figure 2. A schematic 2-D diagram of the effects of diffusion versus precipitation control on crystallization kinetics. A) Diffusion-control effect on nucleation where the slow diffusion rate creates a gradient of depletion in the intergranular fluid surrounding the nucleus. No nucleation can occur in the depleted halo around the nucleus due to the decrease in chemical affinity. B) Diffusion-control effect on growth where competition for nutri- ents among crystals that nucleated closely together retards growth. Crystal A represents an undeterred nucleus where no crystals nucleated near enough to it to weaken growth. Crystals B and C nucleated at the same time as A, but because they are in direct competition for nutrients have grown more slowly. Crystals F and E nucleated at the same time, but because E nucleated on the edge of the depletion halo of D, E has grown much slower. C) Precipitation control on nucleation allows for nucleation to occur anywhere within the volume except within the pre-existing porphyroblast. D) Precipitation control on growth allows for all crystals that nucleated at the same time to be the same size, no matter how close they are. After Hirsch et al, 2000.

pelitic schist in the Pinney Hollow formation. The garnet porphyroblasts grew during Acadian thrusting and nappe emplacement (Rosenfeld, 1970). Other formations include Moretown and Ottauquechee above and Hoosac below the Pinney Hollow formation (Doll et al., 1961). The Hoosac formation is a Precambrian-Cambrian quartz-albite gneiss; Pinney Hollow and Ottauquechee are Cambrian chlorite-garnet schists interbedded with amphibolites; and the Moretown, an Ordovician muscovite-chlorite-epidote schist, overlies the older formations by pre-metamorphic thrust faulting. Metamorphism in the area reached the lowermost staurolite zone of the amphibolite facies (Ratcliffe et al., 1992). Garnet-hornblende-plagioclase-quartz geobarometry indicates peak metamorphic pressures of 7-10kbar, and garnet thermometers imply 560-600ºC for peak temperature (Kohn and Spear, 1990; Kohn and Valley, 1994; Ratcliffe et al., 1992) (Fig. 4).

Worth noting is the work by Whitney et al. (2008) in which garnet porphyroblasts with multiple crystallographic orientations were revealed using high-resolution X-ray computed tomography (HRXCT) and electron backscatter diffraction (EBSD). These garnet polycrystals occur in biotite-rich schist layers within the pelitic units at Townshend Dam, but are largely absent from the paragonite-rich layers. The polycrystals were hypothesized to have formed by the coalescing of multiple garnet nuclei.

In addition to the framework established by previous studies, the Townshend Dam region offers garnets that are the ideal size for this project. The porphyroblastic garnets are large, up to 3 cm in diameter, a necessity for the collection of numerous zones within each garnet for Sm-Nd dating. In addition to having a good size for Sm-Nd analysis, garnets from the Townshend dam exhibit good Mn-zoning (Wright, 2010).

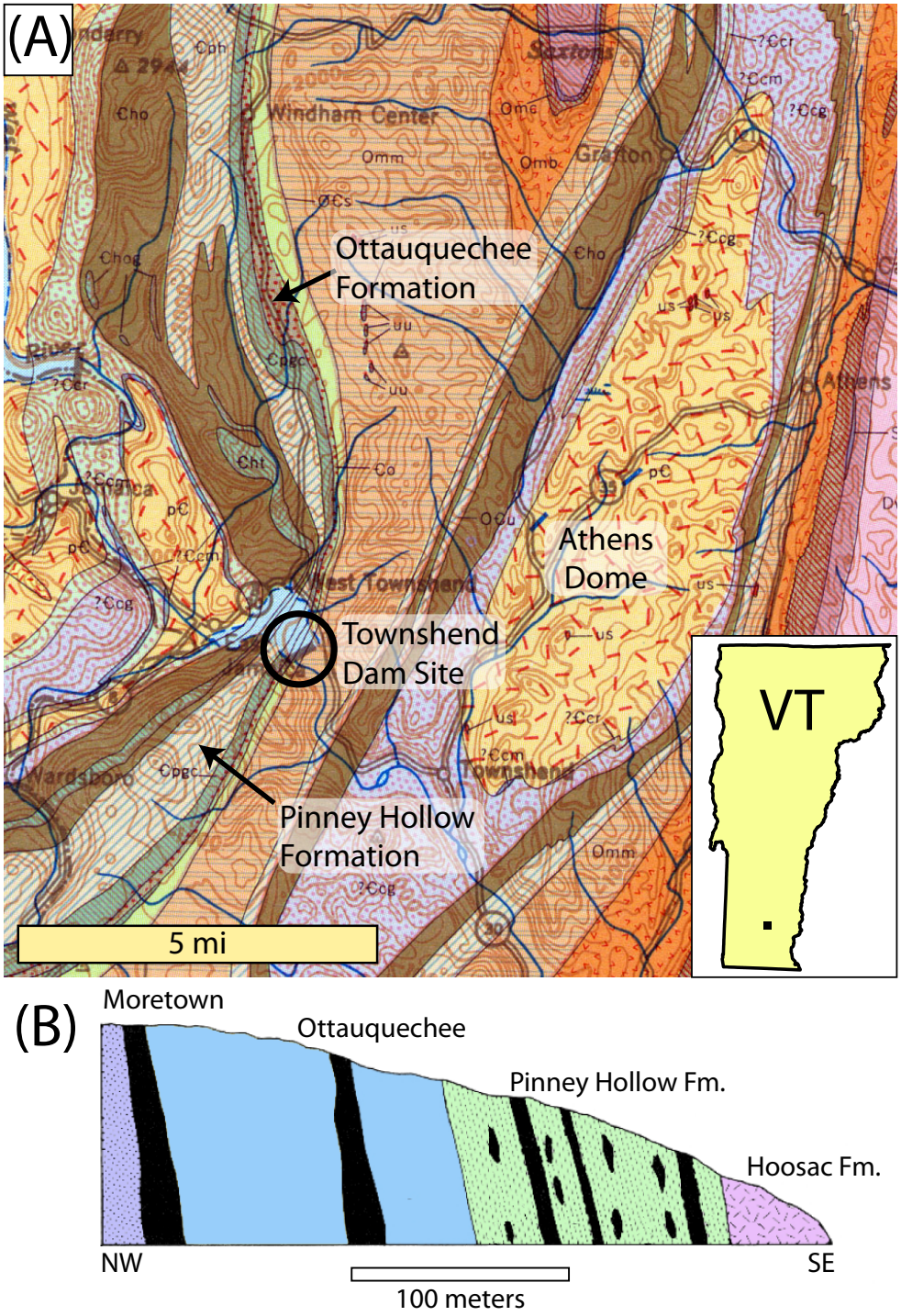


Figure 3. Geologic map of the Townshend Dam region, VT. Sample site is circled in black just west of the Athens Dome. Sample TD0914a (red square) came from the Pinney Hollow Formation (green), which is interbedded with amphibolite (black). After Chamberlain and Conrad 1993.

Geochronology and Geochemistry

In previous studies, samples from Townshend Dam have been dated using two isotopic methods. Karabinos and Laird (1988) dated two separate amphibolites using $^{40}Ar/^{39}Ar$ hornblende cooling ages and found a considerably wide range of the timing of peak metamorphism to be 328 ± 2 Ma and 389 ± 2 Ma. Christensen et al. (1989) used Rb-Sr isotope dating of garnet cores and rims and found that for a single large garnet, growth lasted 10.5±4.2 Myr.

Because these two studies act as a framework for this project, some scrutiny of the unusual Christensen et al. (1989) method is warranted. The method depends on the assumption that the $^{87}Sr/^{86}Sr$ ratio in the matrix is purely dependent on the decay of Rb and is not influenced by transport of Sr in an infiltrating fluid. In order to assess the applicability of the Rb/Sr model ages method from Christensen et al (1989), Chamberlain and Conrad (1993) conducted a study to determine whether the Pinney Hollow formation was infiltrated with fluids that could affect the Rb/Sr systematics during metamorphism. This study assessed the fluid flux using $\delta^{18}O$ zoning in garnets from the Pinney Hollow, Ottauquechee, and Hoosac formations. The researchers found that, depending on their distance from the Ottauquechee contact, Pinney Hollow garnets have varying amounts of ^{18}O zoning. Garnets that were close to the Ottauquechee contact were less zoned than those farther away. Chamberlain and Conrad (1993) concluded that there was metamorphic fluid flowing pervasively from the chlorite dehydration reaction in the Ottauquechee formation into the Pinney Hollow formation at a time integrated flux of $\sim 1.5 \times 10^4$ cm^3/cm^2. From calculations based on the fluid/solid partition coefficient of strontium and oxygen, the researchers concluded that to assume the matrix of the samples is closed to strontium during metamorphism is reasonable.

Another study on $\delta^{18}O$ zoning in Townshend garnets (Kohn and Valley, 1994) greatly diminishes the time integrated flux approximations from Chamberlain and

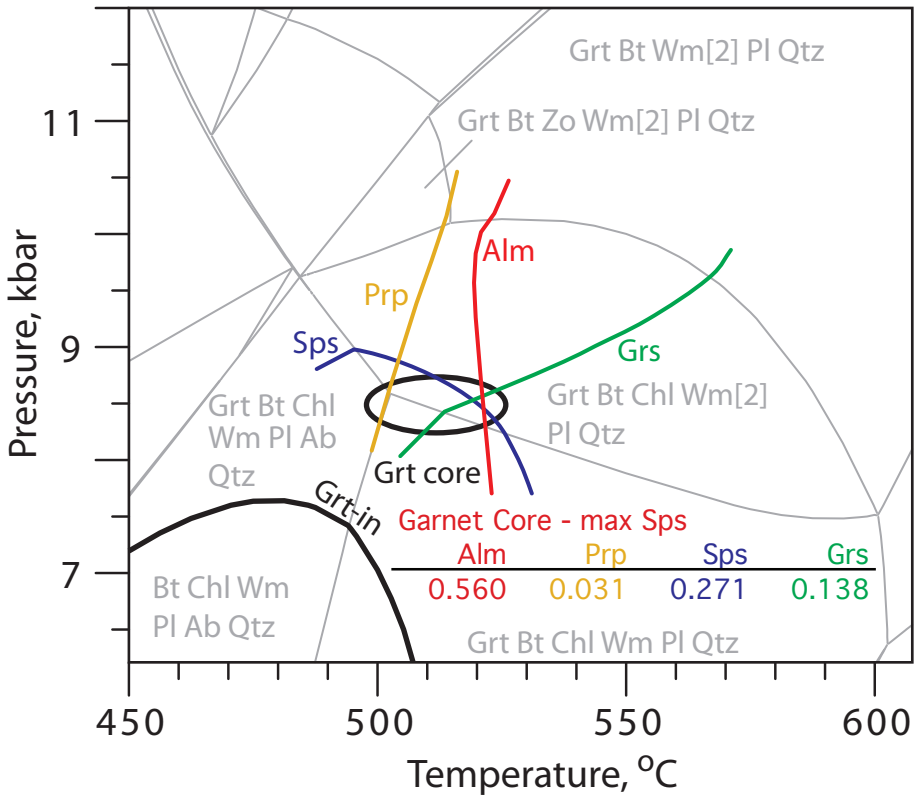


Figure 4. P-T diagram representing metamorphic conditions of schist from Townshend Dam. The garnet core black ellipse represents the temperature and pressure at which garnets began growing (510ºC and 8.5 kbar). Peak conditions ellipse represents calculated peak temperature of 560-600ºC from (Kohn and Valley, 1998) and pressure of 0.9-1.0 GPa from Kohn and Spear (Kohn and Spear, 1990). From Hirsch, Stowell and Baxter's NSF proposal (2009).

Conrad (1993). Using similar methods to the previous study, the data show evidence for cross-foliation time integrated fluid fluxes to be less than 300-600 cm^3 / cm^2. However, strike-perpendicular pervasive fluid flow was proven to be unlikely while channeled fluid flow or layer-parallel fluid flow were more likely. This study explains isotopic gradients present in garnets using diffusion alone.

Methods

Sample Selection

After preliminary work with samples from Townshend Dam, VT, Baxter, Hirsch, Stowell and their graduate students collected sample TD0914a in 2009. This sample was chosen for its non-friable, paragonite-rich, biotite-poor characteristics, as well as the many large (1-3 cm diameter), euhedral garnets with relatively few visible inclusions. Slow garnet growth in this locale (Christensen et al., 1989) provides a high probability of garnet-matrix equilibrium and enables the possible distinction in age between cores, mantles, and rims using Sm-Nd dating. Due to the effects that polycrystals could have on the kinetics work, TD0914a was chosen for its higher percentage of paragonite and lower percentage of biotite in the matrix (Whitney et al., 2008).

The entirety of TD0914a ($1.21x10^4$ cubic centimeter volume) was texturally characterized at the University of Texas in Austin using HRXCT (Fig. 5). Tomography collects a set of two-dimensional images (Fig. 6), here spaced 0.75 mm apart, with a pixel size of 0.64 x 0.64 mm, allowing the production of a three-dimensional rendering with 0.31 mm^3 voxel size (a voxel is the 3D equivalent of a pixel).

BLOB3D was used to process the HRXCT data (Ketcham et al., 2005). This process consisted of separating garnet porphyroblast voxels from the rest of the

sample matrix. Because garnet attenuates X-rays more than the matrix minerals do in this sample, it appears as a lighter color in the HRXCT imagery (Fig. 6). This clear difference in colors makes the separation and extraction of garnets relatively simple using BLOB3D. Measurements that can be collected for each porphyroblast by BLOB3D include volume, x and y coordinates, radius, and other geometric qualities like aspect ratio, etc.

In August of 2010, the research group gathered at UA for selection and extraction of garnets from TD014a for chemical zone specific Sm-Nd dating. Guided by the HRXCT data, garnets were chosen for crystal perfection, low density of inclusions, size (larger size makes for more accurate dating but collecting data only from large garnets would not provide a good representation of the total specimen), their location within the sample (to obtain a relatively even distribution), and a large enough distance from their nearest neighbor for extraction without harming other garnets (Fig. 7). Also at this time of garnet extraction, a 3940 cm^3 subvolume (Fig. 8) was removed for crystallization kinetics (this study). The kinetics subvolume was chosen for its central position within the sample as well as its position relative to the set of garnets extracted for Sm-Nd dating, its equant shape, and the large number of porphyroblasts of varying sizes.

Sm-Nd Dating

The first step on the way to understanding the kinetics of garnet porphyroblast nucleation and growth in TD0914a was to date 38 Mn zones from ten garnets using the Sm-Nd methods of Pollington and Baxter (2011). Methods for Sm-Nd dating include establishing chemical zonation contours of the polished garnet samples using EPMA, extracting samples with known Mn abundance using a microdrill (Fig. 9), removal of crystal bond in an acetone bath, crushing and sieving, magnetic separation, handpicking, and leaching to remove inclusions. Additionally, two groups of very small garnets

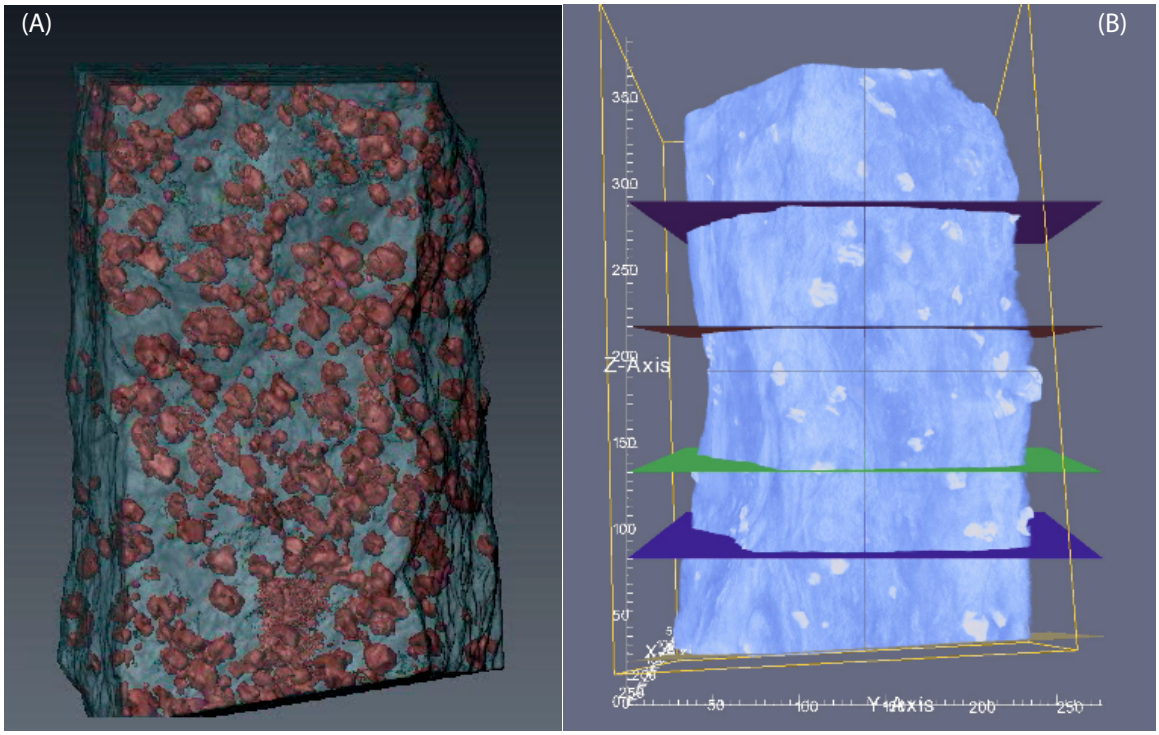


Figure 5. Representations of HRXCT data of TD0914a. A) was made using AVIZO and represents garnets as deep red and matrix as slate blue. B) was made using PARAVIEW and shows the slices made during subvolume and garnet extraction at UA. Kinetics subvolume is between the red and green planes. Scales on B are Z and Y axes and in mm.

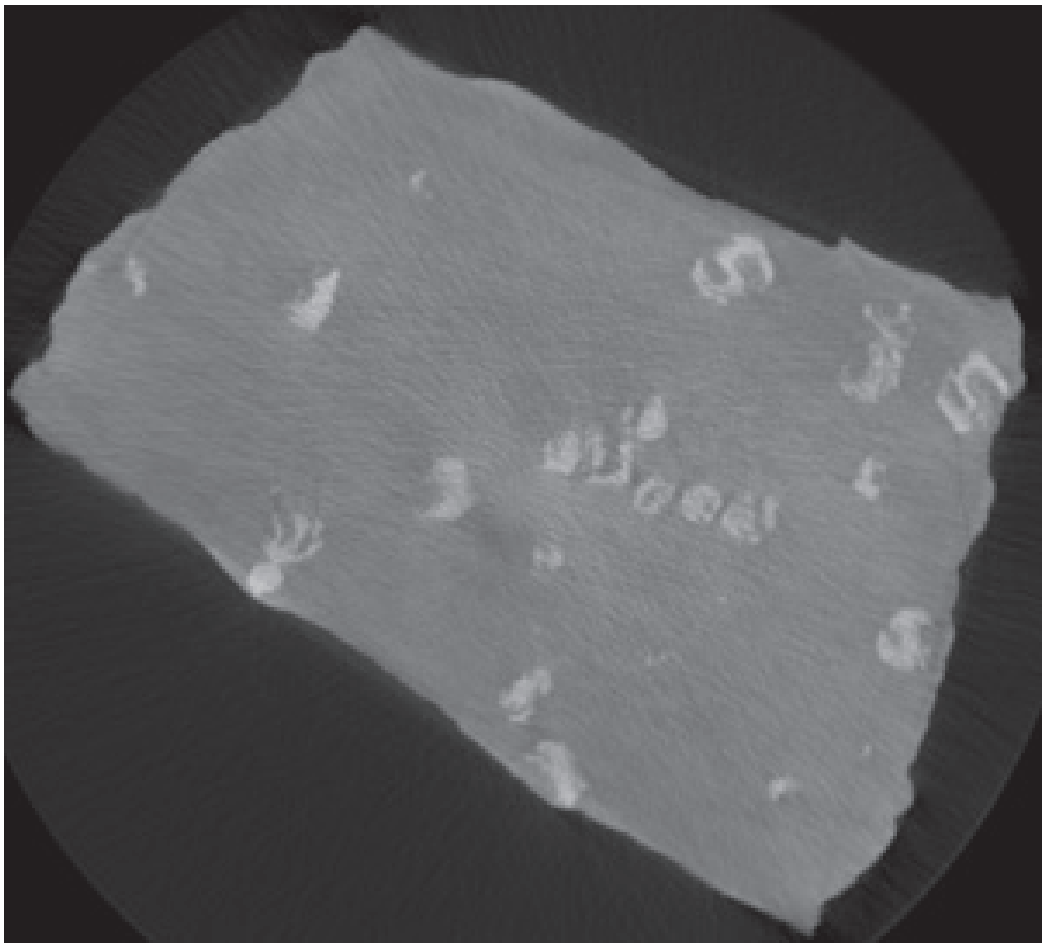


Figure 6. Sample slice from TD0914a HRXCT imagery. Higher density is lighter color (garnet porphyroblasts, the largest of which is ~3cm) and lower density is darker color (surrounding schist). From the University of Texas at Austin High Resolution X-Ray Computed Tomography Facility.

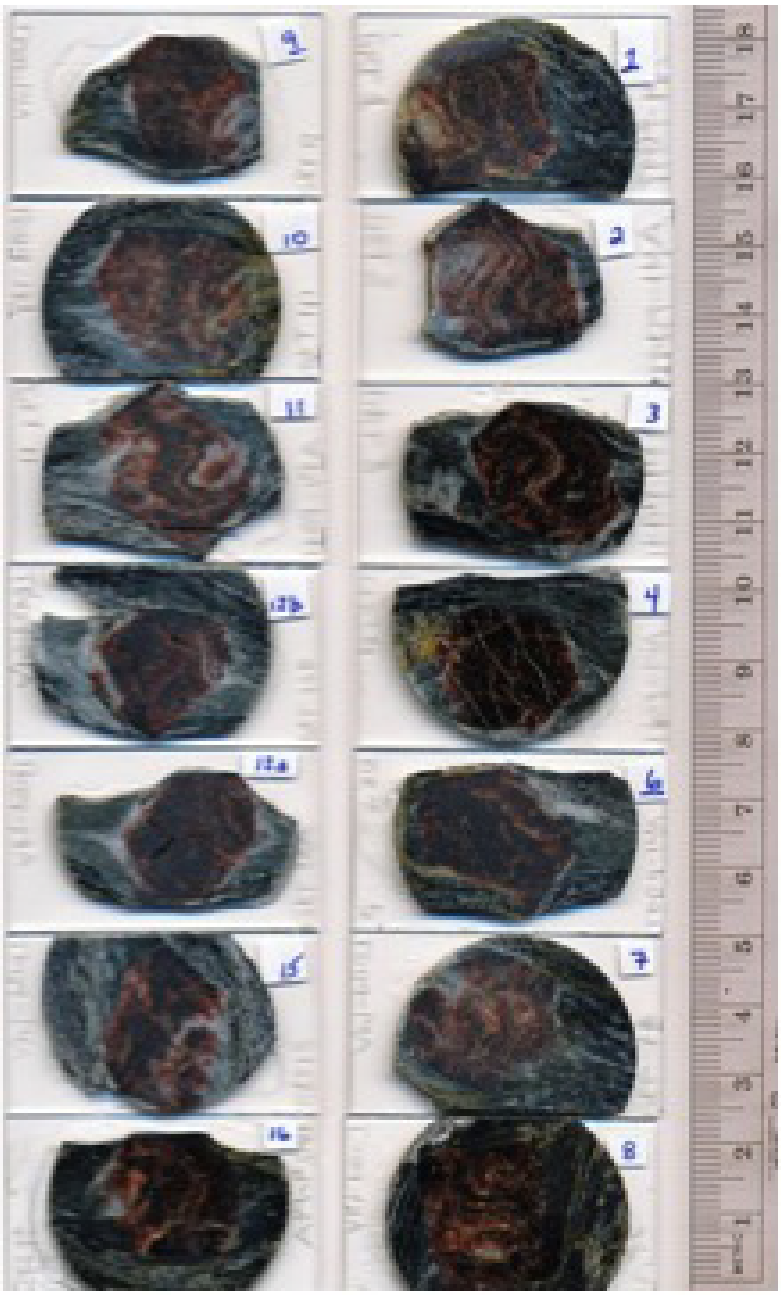


Figure 7. Garnets drilled out using a large core drill bit on a drill press at UA. Samples were serial sectioned, photographed, and then microprobed before being micromilled and dated. Images from Gatewood (pers. comm. 2011).

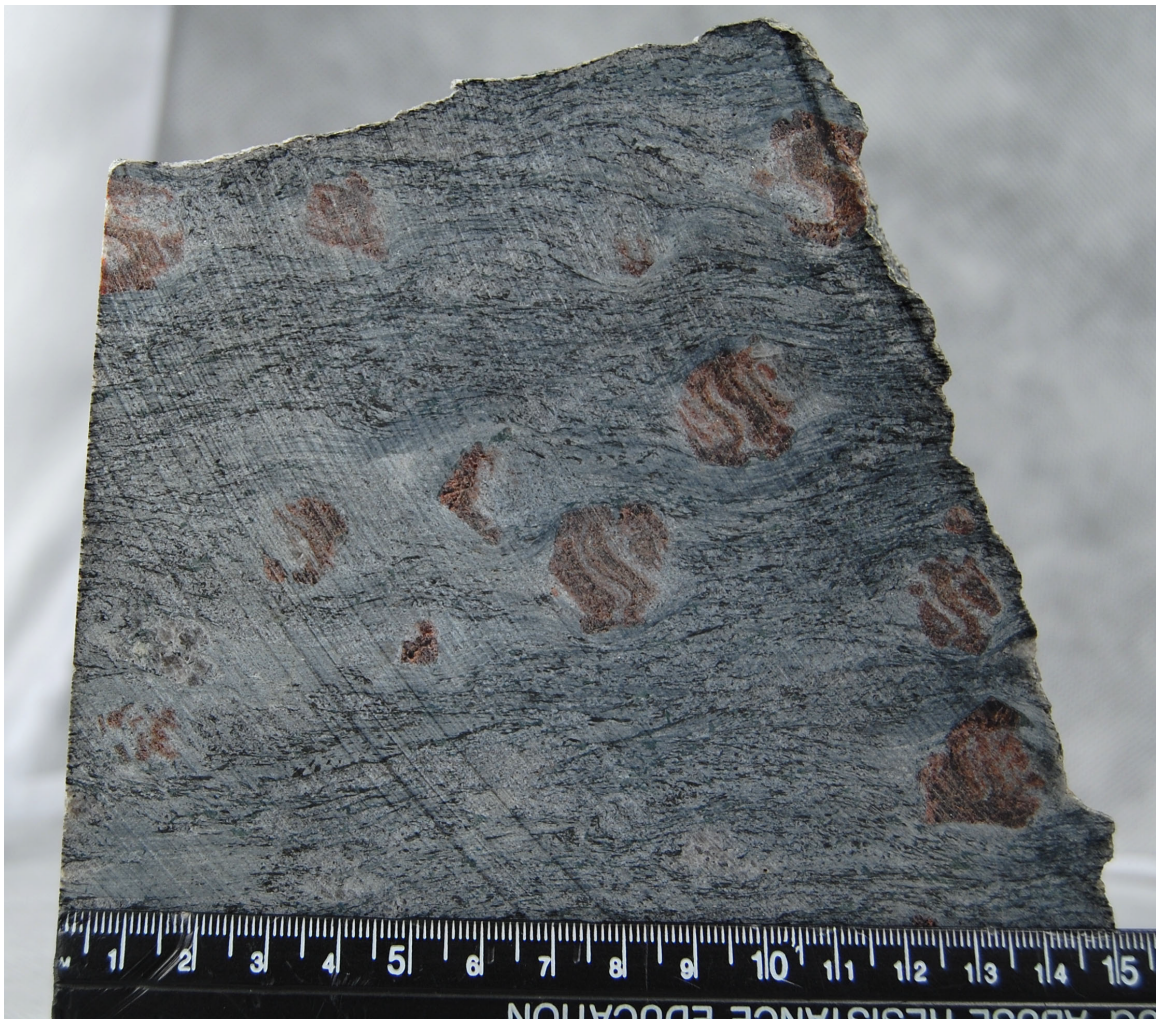


Figure 8. Equant kinetics subvolume from TD0914a. Subvolume was extracted from central area in larger sample, measuring 15cm x 15cm x 9cm. Refer to figure 5 for location of subvolume within entire TD0914a. A total of 92 garnets were extracted from the sample and 78 were analyzed on the electron microprobe at UBC.

measuring 1-2mm and 3-4mm respectively were analyzed. These garnets were extracted from the kinetics subvolume, sectioned, polished at WWU and analyzed using EPMA at UBC. Because the garnets were so small, halves of four garnets were used to make up each group subjected to Sm-Nd analysis. All garnet preparation for Sm-Nd analysis other than EPMA and extraction of the small garnet groups was conducted by Besim Dragovic and Matt Gatewood in the Boston University TIMS Facility. The purified samples are then fully dissolved and mixed with a $^{147}Sm/^{150}Nd$ spike. A three-part column chemistry procedure followed to remove Fe, separate REEs, and isolate Sm-Nd. Isotopic compositions of Sm and Nd were determined using Thermo-Finnigan TRITON thermal ionization mass spectrometer (TIMS). The Sm/Nd analysis procedures in this project included a special filament loading technique developed in Harvey and Baxter (2009). Nd samples were loaded in 2M HNO_3 in small increments onto a Re filament. The Re filament was outgassed prior to loading. During the loading process a 0.6A current was run through the filament. Once the sample dried on the filament, 2 μL of Ta_2O_5/ H_3PO_4 activator was loaded on the sample. Sm was analyzed as a metal after being loaded onto double Re filaments. This procedure allows collection of good data from very small samples. Dragovic performed all of the TIMS isotopic analyses at Boston University. Sm-Nd isotope data and related age interpretations are presented and discussed in the Ph.D. theses of Dragovic (2013) and Gatewood (2013). Chemical-zone-specific garnet sample sizes were between 12 and 20 mg after hand-picking and purification. Total amounts of measured Sm were between 0.8 to 2.1 ng and 5.7 to 22.9 ng for Nd.

In addition to analyzing garnet segments, whole rock and matrix samples were extracted and analyzed for Sm and Nd compositions. Ages for each garnet segment were then calculated by Dragovic, Gatewood, and Baxter with the linear regression algorithm by York (1969) using ISOPLOT (Ludwig, 2008). Isochron age determinations require at least one more sample analysis (in addition to the garnet) on the isochron that the

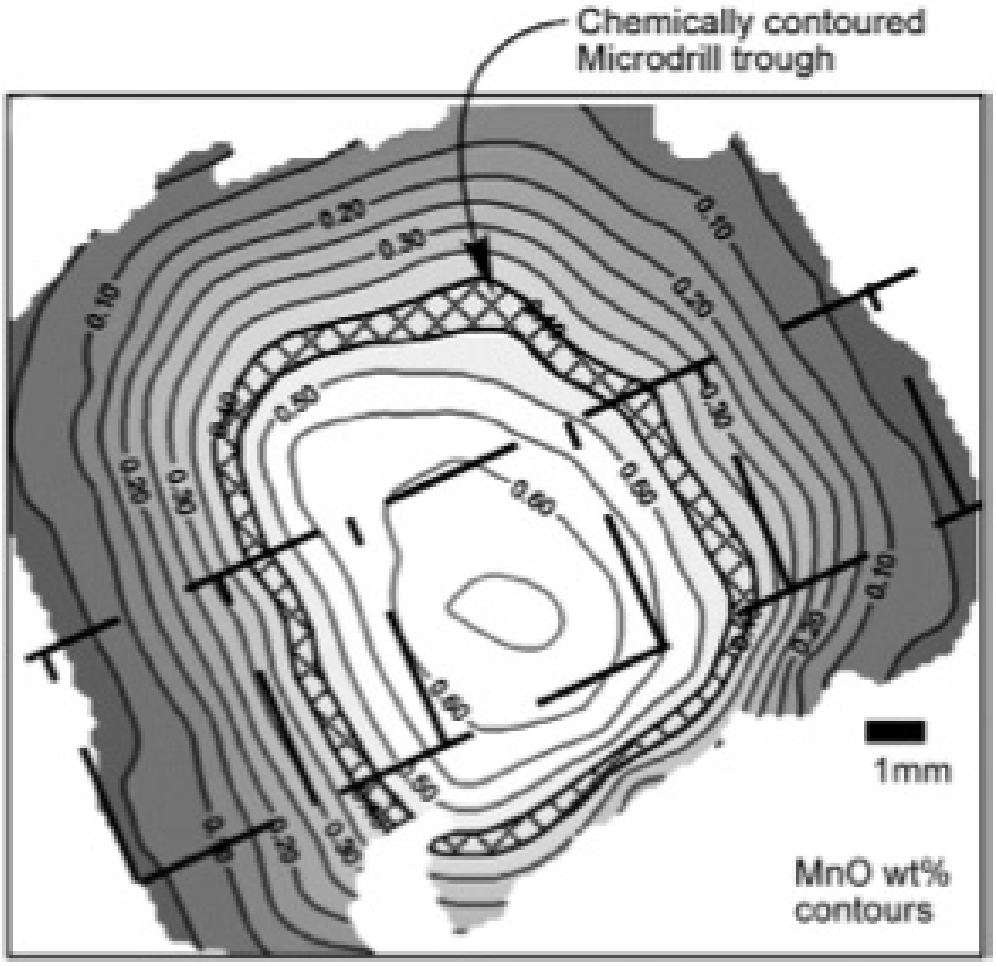


Figure 9. Contours of MnO abundance in garnet (in wt%) from Townshend Dam. The cross-hatched area represents a growth zone that could be extracted for Sm-Nd isotopic analysis. Baxter and others used a micromill to remove unwanted garnet material surrounding the cross-hatched area and analyzed the sample that remained behind. From Pollington and Baxter (2011).

garnet grew in Nd isotopic equilibrium with. Towards this end, rock matrix powders taken from adjacent to each garnet were also analyzed for Sm-Nd. Five large whole rock (i.e. including all matrix minerals and garnet) analyses were also performed as well as a linear matrix traverse with 1cm spacing across the entire specimen. In this thesis, the age interpretations used in the modeling (Table 1) are two-point isochron ages paring each garnet with its adjacent matrix. This is in contrast to Dragovic (2013) and Gatewood (2013) who note significant matrix heterogeneity at the cm scale and suggest that more accurate ages will result from pairing of each garnet with all matrix and whole rock data, thus incorporating the natural uncertainty in the composition of the matrix from which each garnet sample grew and equilibrated.

There are several reasons as to why this project uses Sm-Nd dating. First, due to garnet's preference for incorporating heavy rare earth elements (HREEs), garnet has a much higher Sm-Nd ratio than the surrounding matrix, making a larger spread of results on a garnet-matrix or garnet-whole rock isochron and therefore greater precision. Additionally, resetting of the Sm-Nd system by post-garnet-growth events or external disequilibrium is improbable, unless temperatures exceed the "closing temperature" of garnets (roughly 650-750 ºC) for a sufficiently long period of time (e.g. Pollington and Baxter, 2011). This means that unless there is a major metamorphic event, the Sm-Nd system will retain an accurate age of garnet growth (Baxter et al., 2002). Past studies have found that the garnets in this area have recorded only one phase of metamorphism with a peak temperature of 560 – 600 °C (Kohn and Valley, 1998) (Fig. 4). Therefore, the closing temperature of the garnets has not been exceeded, and the ages derived from Sm-Nd dating represent primary growth ages.

Differentiating between zones of each dated garnet is important for this thesis in order to calculate changes in growth and nucleation rates. Because differentiating among various zones of each garnet (core, rim, and mantles) requires very small samples,

the Sm-Nd dating method from Harvey and Baxter (2009) was used in contrast to a Lu-Hf method. Thus far, Hf cannot accurately be measured in such small sample sizes as Nd can be. Also, because Lu is strongly fractionated in the garnet, core analyses are easy and precise, but rim analyses are more difficult and less precise because of the low Lu/Hf ratio at the rims. Sm-Nd has a more evenly distributed zonation which provided a more precise analysis of all zones for this thesis.

Because each garnet zone was also analyzed for Mn content, the formulation of the Mn-Age relationship was possible (for more information on Mn-age relationship, see section below). However, before modeling the relationship between Mn and age, culling the Sm-Nd dataset was necessary. The culling process is explained below in the Results section.

Mn-Age Relationship

In order to establish the Mn-age relationship, the age of each garnet growth zone was plotted against its X_{Mn} (Fig. 10). If the assumptions we have made are accurate (the entirety of TD0914a is in equilibrium with respect to Mn, and there is a relationship between Mn in garnet and time since nucleation), then we should be able to find a mathematical relationship between age and Mn content. There are many mathematical possibilities when finding this relationship, ranging from a simple linear fit to a complex formula that could characterize a more accurate geologic picture. The methods in this project explored the applicability of each option.

In order to derive a geologically reasonable form of the Mn-age relationship to which the data could be fitted, a combination of approaches was used together with rock data and hypothetical values. Note that this method was employed solely to derive the form of the Mn-age relationship; the parameters in that form would be fitted using the observed Mn-age data described above. First, the relationship between the mode of

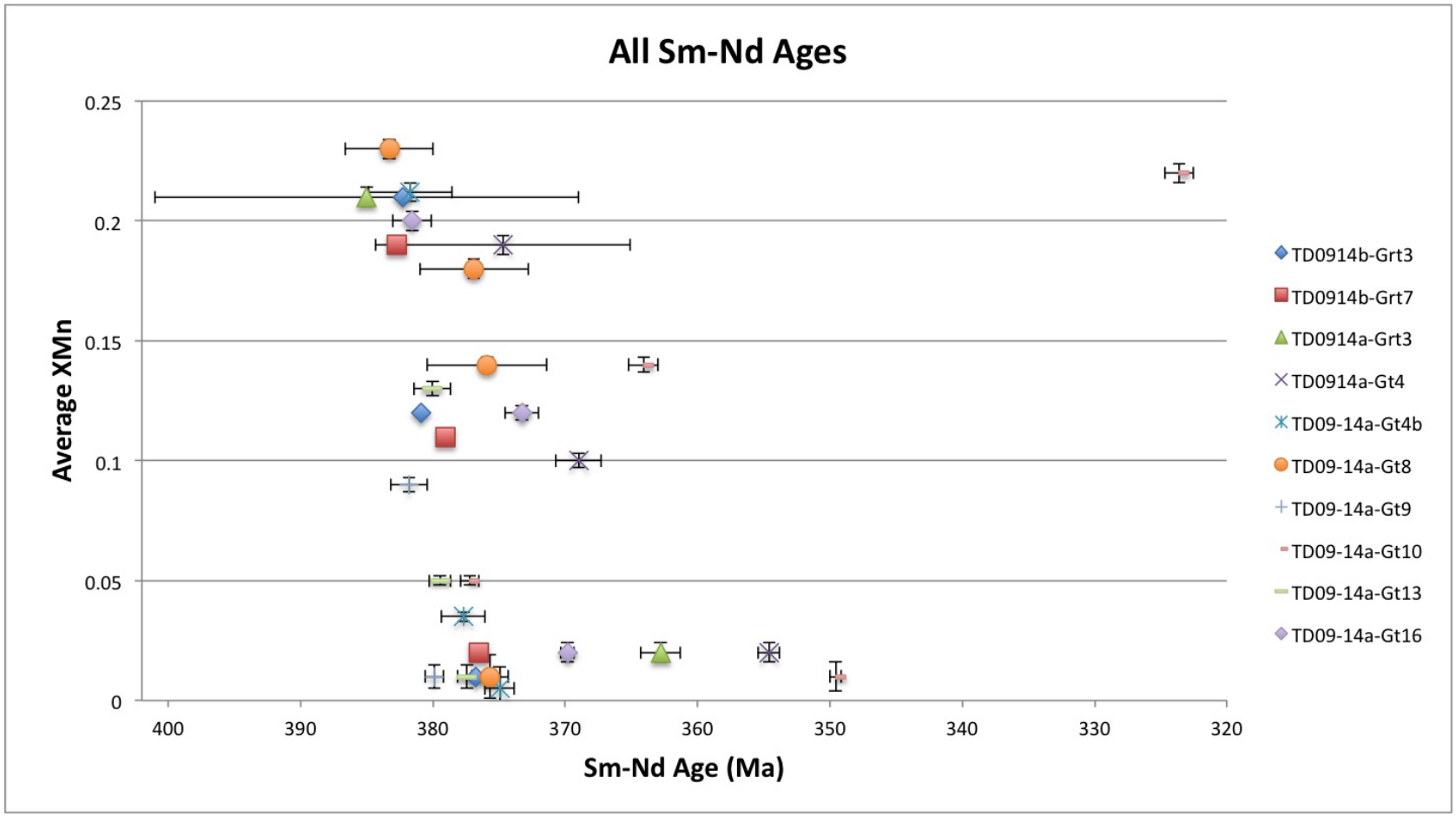


Figure 10. Total Sm-Nd dataset, unculled.

garnet and time must be established. If modal garnet is a function of time, then so Mn will be. This project derived the shape of the relationship between time and the mode of garnet (W_G) in the system using whole rock XRF data collected by Gatewood from TD0914a (Table 2) and the thermodynamic program, Perple_X (Connolly, 2005). In this instance, time is understood to be measured as Myr since the initiation of garnet growth. In the absence of more detailed information about the prograde metamorphic event, temperature and pressure are presumed to have increased at a regular rate with time. This project can use a simple relationship between pressure and temperature over time because the form of the curve is the sole objective of this exercise. In order to make the process simple, an even increase of 10K and 100 bar per Myr were used to model the relationship but those values are irrelevant to the form of the equation. This thesis used equations

$$T(t) = 10t + C_1 \quad (1)$$

and

$$P(t) = 100t + C_2 \quad (2)$$

where *T* is temperature in Kelvin, *P* is pressure in bars, *t* is time in Myr since the onset of garnet crystallization, C_1 is a constant representing the temperature at the onset of garnet crystallization, in Kelvin, and C_2 is a constant representing the pressure at the onset of garnet crystallization, in bars. During the experimentation, the calculated value for C_1 was 773, and C_2 was 7000 bars.

If a prograde metamorphic event were occurring, then with normal increasing pressure and temperature would come an increase in modal garnet over time. For each of a set of pressure-temperature conditions, the expected mode of garnet was determined from the pseudosection created using Perple_X. Table 4 includes the outputs of garnet mode calculated from the inputs of increasing temperature and pressure, and figure 11 shows the relationship between increasing modal garnet with increasing temperature. A linear model acts as a good representation of this relationship. The results of that model

are

$$W_G(T) = 0.154(10t - C_1) - 117. \quad (3)$$

After calculating the relationship between mode garnet and time, the Rayleigh depletion equation from Hollister (1966) was used to extrapolate the relationship between Mn and time. Considering the garnet zoning Rayleigh depletion model, the relationship between Mn and age could also give insight in to the dynamics of the formation of garnets. For reference, the Rayleigh depletion equation is

$$M_G = \lambda M_O (1 - \frac{W^G}{W^O})^{\lambda - 1} \quad (4)$$

where M_G is the weight fraction of an element in the garnet's growing edge, in this case, X_{Mn}. λ is a distribution coefficient, equal to the ratio of the weight fraction of Mn in the edge of the garnet to weight fraction of Mn in the matrix. M_O is the initial weight fraction of Mn in the sample before garnet nucleation, represented by the whole rock XRF measurement of Mn. W_G is the total mass of crystallized garnet, and W_O is the initial mass of rock prior to garnet crystallization. W_O was assumed to be 100 percent in this situation.

Placing the calculated values of garnet mode as a function of time as well as the whole rock XRF data from Gatewood into Hollister's equation, we get

$$X_{Mn} = 23 \times 0.031 (1 - \frac{0.154(10t + 773) - 117}{100})^{22}. \quad (5)$$

Treating all variables except M_O and t as parameters to be fitted, the above equation was modeled using Excel. First, in order to simplify the model process, equation 5 was simplified to

$$X_{Mn} = a(1 + bt + c)^d. \quad (6)$$

Variable *a* represents the product of initial Mn and λ. Variables *b* and *c* in combination are representative of the relationship between modal garnet and time, *t* is time, and *d* is λ minus one. This equation represents the *shape* of the relationship between Mn and time, and the variables were manipulated in Microsoft Excel in order to

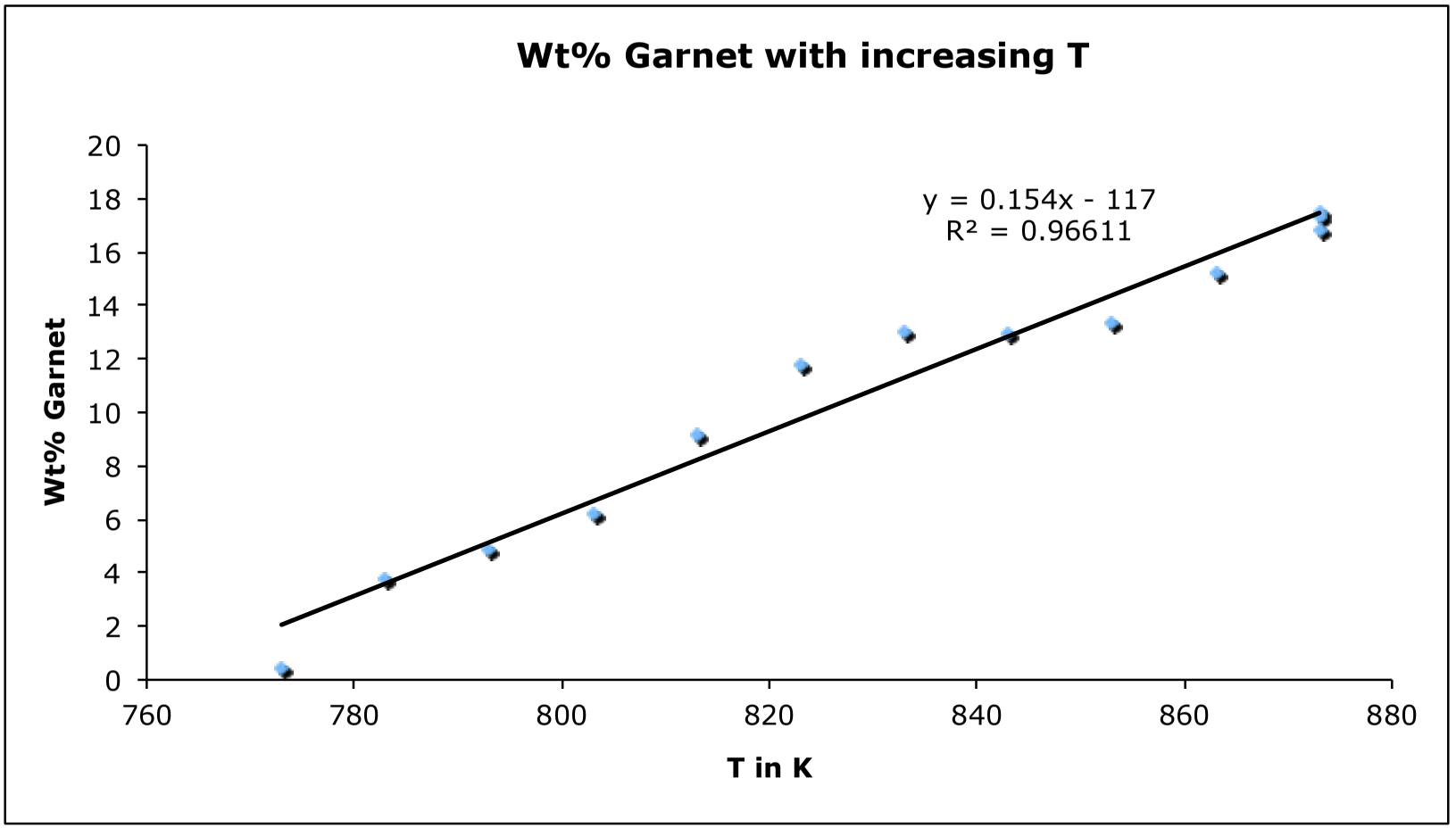


Figure 11. Relationship between temperature and weight percent garnet in sample TD0914a calculated using Perple_X.

better represent the actual system. Once the best representation was modeled in Excel, the equation was fit to the data using a least squares function in OCTAVE (a freeware version of MATLAB). Because the results were unsuccessful (see Results section below), a linear fit was also calculated.

In order to establish a mathematical and statistically rigorous linear relationship between Mn and age with error, the $^{147}Sm/^{144}Nd$ and Mn data were run through the MATLAB function WTLS_LINE_OFFSET (Krystek, 2007, modified by D. Hirsch) (App. 1). This function calculates a weighted total least squares fit of a line to data with uncertainties in both x and y. In this instance the x input was the Sm-Nd age and y was X_{Mn}. The function produces α (the slope of the line in radians) and *p* (the distance of the line from the origin) along with the variance of each. This function offers a more stable calculation of a linear relationship than y=mx+b because if *m* and *b* are used, the slope is undefined for vertical lines, error is biased toward the y value, and precision decreases with increased distance from the origin. WTLS_LINE_OFFSET also centers the data midpoint around the origin during the fitting process to decrease the distance effect on error.

REF2LINEBEST (App. 1) was used to perform a Monte Carlo simulation using the α and *p* values to calculate the uncertainty of each output value (age) derived from each input value (X_{Mn}). With these functions, the Mn-age and uncertainty of X_{Mn} values along 160 transects from 78 garnets were calculated.

Garnet extraction and SEM analysis on a subvolume

Out of the total kinetics subvolume, 92 garnets were extracted for further analysis (Fig. 12). Each garnet in the subvolume was extracted using a drill press, Dremel rotary tool, and an air scribe—a pneumatic tool generally used for fossil preparation—with HRXCT imagery as guidance. Of the 92 garnets extracted, 78 garnets were intact and oriented upon removal. Once the garnets were removed, those that were

intact were named using an alphabetical system (A-Z, AA-AZ, BA-BZ, CA-CZ), bonded to a glass slide with Crystalbond™, and cut using a Buehler IsoMet 1000 Precision wafering saw. The blades of the wafering saw range from 0.014 to 0.015 inches thick, allowing for very small loss of garnet material. A series of cuts approximately 1mm apart (excluding the kerf) were made until the morphological center of the garnet was found. Figure 13 shows the method of cutting the garnet using a wafering saw. This method of extraction preserves most of the sample for possible future studies. After the central 1mm-thick wafer was removed from each garnet, the Crystalbond™ was dissolved using acetone. The wafer was then adhered to the slide with Petropoxy™ and polished using lapidary wheels and diamond paste down to 0.1 μm grit.

As each central wafer was completely prepared, backscatter images and qualitative cation maps of zoning patterns were collected using the WWU SEM and the Energy Dispersive X-ray Spectrometer (EDS) (Fig. 14). These images and cation maps acted as spatial guides for easily collecting precise and accurate Mn concentration data using EPMA at University of British Columbia in Vancouver (UBC). However, garnets of this large size were far larger than the largest possible field of view in the SEM. Multiple maps were collected on each large garnet around the approximate location of the center. These maps were then seamed together using Adobe Photoshop to make one cohesive image (Fig 15).

EPMA

Microprobe analysis occurred at UBC under the supervision of Mati Raudsepp. The UBC facility uses a Cameca SX-50 Scanning Electron Microprobe with four vertical wavelength-dispersion X-ray spectrometers and a SAMx energy-dispersion X-ray spectrometer. Measurements were taken using a ~20A beam current, ~15 voltage, and ZAF quantification method. Each garnet was measured along one, two, or three core-to-rim orthogonal traverses with 15-300 μm spacing. The core position was defined

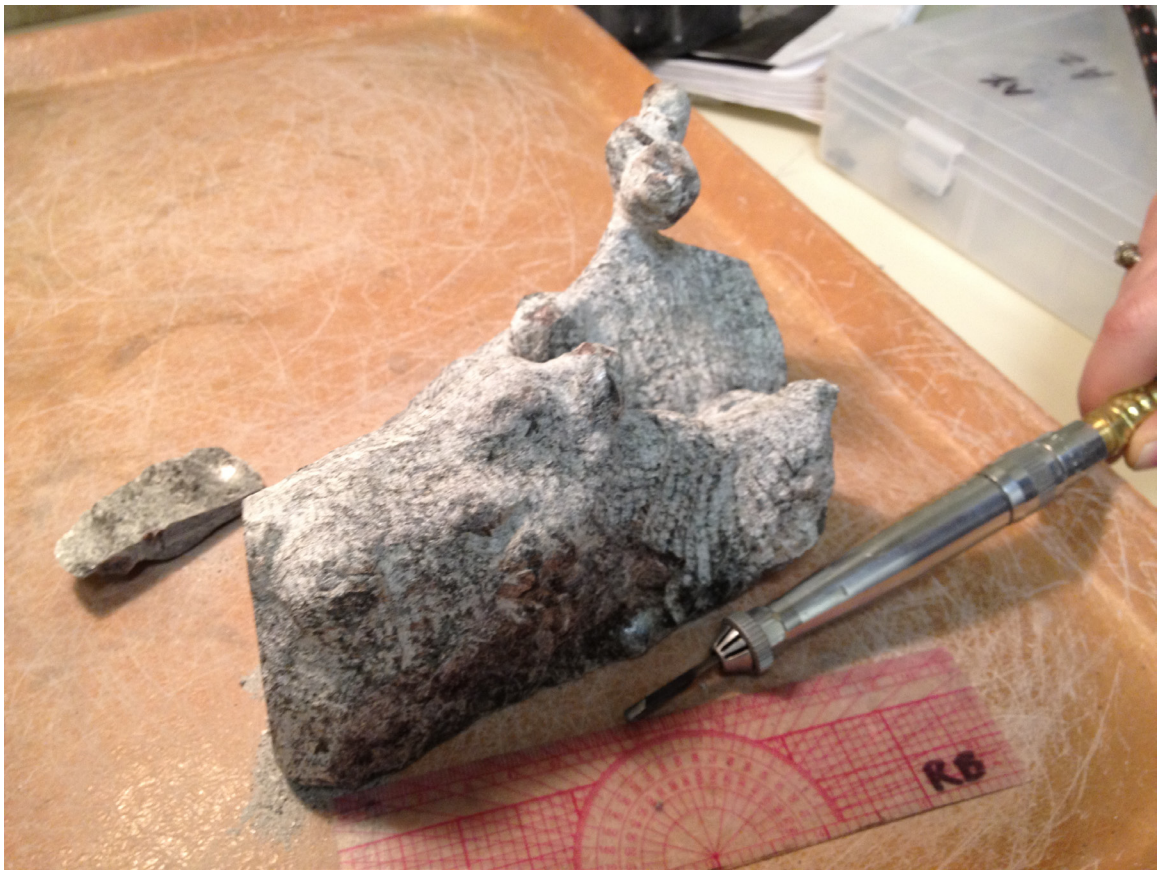


Figure 12. Sample TD0914a partially disaggregated with air scribe in foreground.

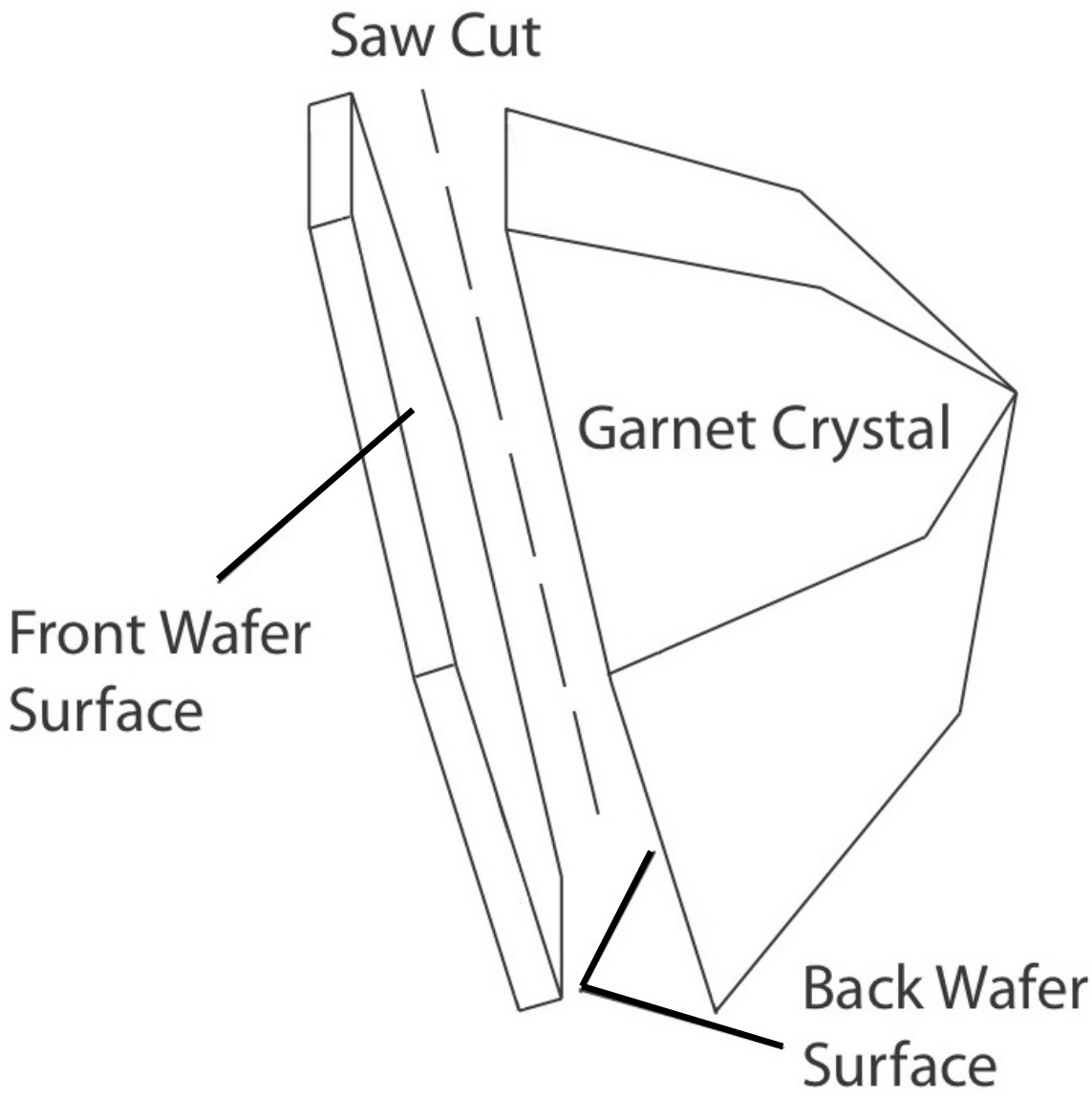


Figure 13. Schematic diagram showing spatial relationship between the garnet crystal and the analyzed front wafer. A thin slice represent- ing the morphological center will be cut off the main garnet body using a wafering saw. The front wafer surface will be analyzed for composition using SEM and the back wafer surface with the remain- ing garnet crystal will be saved for possible future study. From Wright (2010).

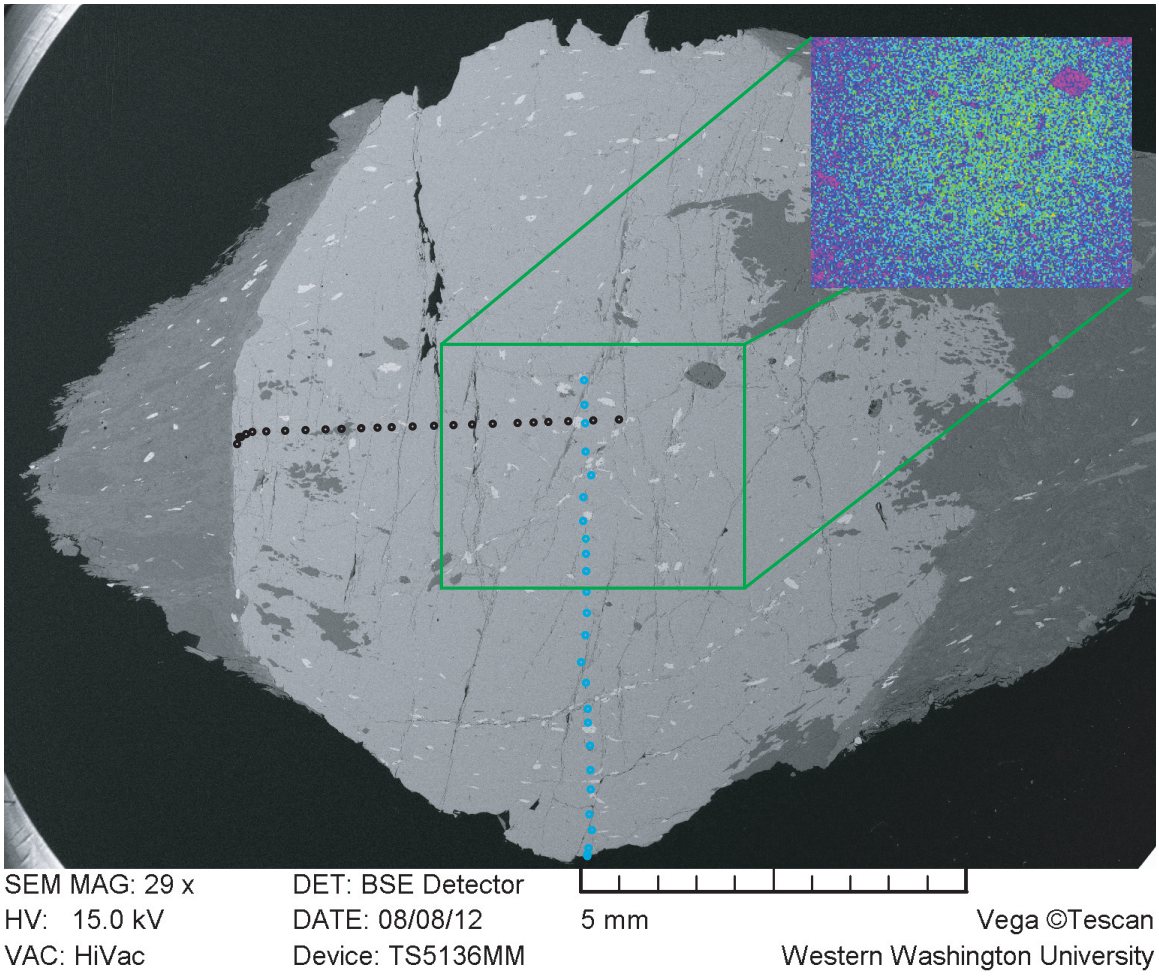


Figure 14. BSE image and EPMA traverses of garnet CJ along with corresponding qualitative Xray Mn map.

as the point with the highest Mn value from EDS cation maps. The core location was purposefully "overshot" in order to compensate for uncertainty in the EDS Mn map. The elements measured at each point were Mn, Fe (as Fe^{2+}), Si, Al, Ti, Mg, and Ca. Because some of these garnets are snowball garnets, the first EPMA traverse was taken following the curve of the inclusion trail rather than taking a linear path. The second garnet instead had linear EPMA traverses. Upon comparison, each path showed a regular, curvilinear decrease in Mn content with distance from the core. At this conclusion, linear traverses were used because collecting at regular intervals with orthogonal intersections was faster and easier to plan using the qualitative EDS cation maps. Also, faster EPMA setup allowed more measurements on each garnet.

In order to guarantee quality data, low-quality traverse points as well as points measured on inclusions were removed. Before culling any points, the Mn values were first converted to ages using the Mn-age equation. Previous to, but separate from, the removal of outlier points on all of the subvolume microprobe Mn-age data, garnets AA, AJ, AV, and AP were run through several tests in order to qualify the outlier removal process. First, outliers were removed based on their total sum oxide percentage. A measurement outside of 98-102% sum oxide, was concluded to be either a bad measurement or an inclusion, and was thus removed. Then, a polynomial was calculated between the Mn value and the distance form the core using a least squares fit. A sixth-order polynomial produced the smallest R^2 value, so was chosen as the order of polynomial to which all Mn data were compared. After establishing a strong, clean dataset on garnets AA, AJ, AV, and AP using the aforementioned tests, a program was written to remove outliers for every garnet traverse. Because sum oxide was not useable in the full dataset, aluminum and silica abundances were used to define stoichiometric compliance because they do not vary with solid solution. The stoichiometric tests removed a comparable amount of data as the sum oxide test did; therefore, the Al and

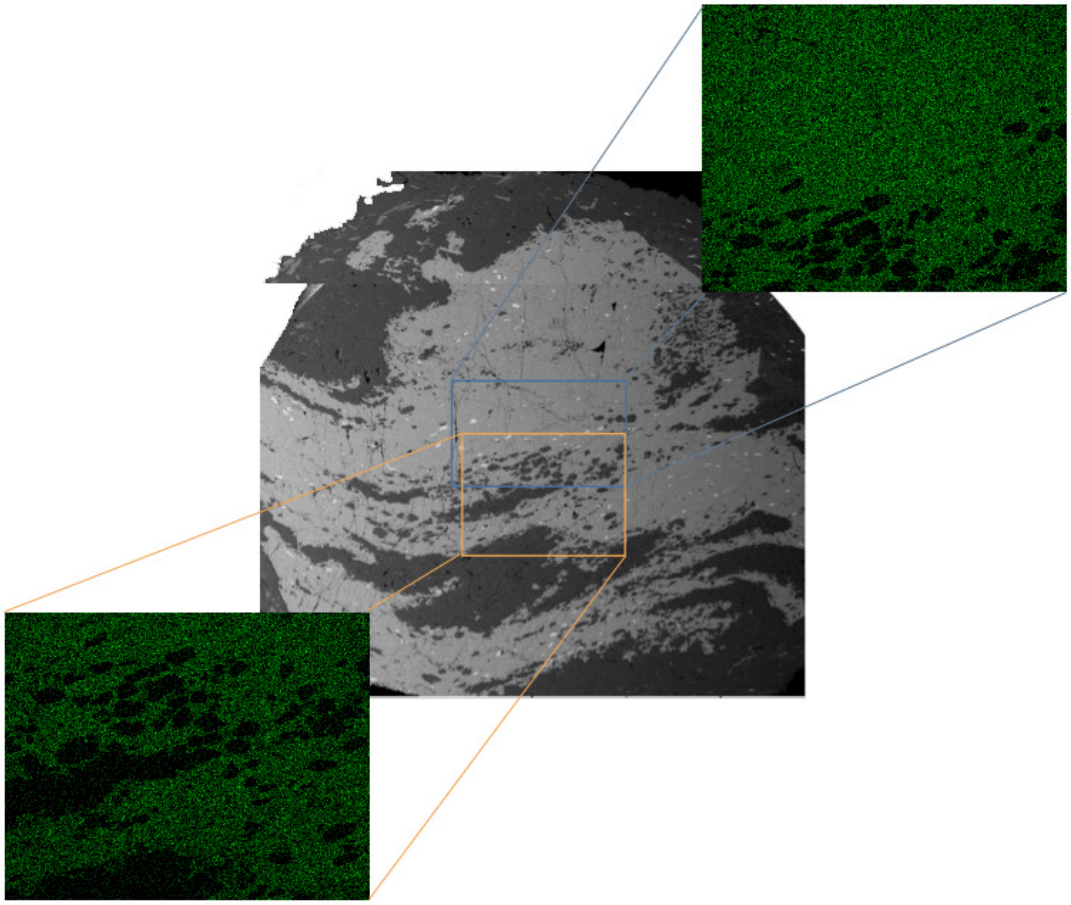


Figure 15. Garnet AH with multiple qualitative Mn EDS cation maps. The boxes show the size of each area of interest measured on the SEM.

Si tests were found to be fair proxies. In order to remove noise, each Mn-age value was compared to the representative polynomial fit. For each analysis point, the difference between the calculated Mn-age and the polynomial fit is the offset. Next, the age variance of the four points surrounding the third analysis point was calculated. The variance for the set of four points was taken and compared to the offset of the central point. The offset of each point thereafter was then compared to the variance of the first five points. If the offset was greater than ten times the variance of the first five points, the point was defined as an outlier and removed. The factor-of-ten value was chosen based on exploratory attempts at outlier removal along with comparison to subjective attempts at outlier removal. Though the aforementioned culling process was used to relative success, a better way of culling points would be to calculate a mean variance for the entire traverse, comparing the variance of every five points down the line to the offset. This would remove a few more of the outliers, making a cleaner, clearer growth rate curve farther down the line.

Determination of growth and nucleation rates

Calculating the age of each Mn value provides both a measurement of the radial growth of the garnet and the rate of nucleation within the kinetics subvolume. The highest-Mn point of each garnet is assumed to be the nucleus. The Mn-age of that point is the nucleation age. The ages of nucleation of all 78 garnets from the subvolume were calculated in order to determine the nucleation rate (nuclei/Myr/cm^3). The difference between the Mn-age of the core and that of the rim is the duration of growth for that garnet. Incremental growth curves are calculated for each garnet using the age of each point along a traverse (Fig. 16). The growth rate at any given point is calculated by taking the change in radial distance over the change in Mn-age from the previous point. Due to the nature of this calculation, the noise in the Mn-age data has a very large effect on growth rates, especially when two points are very closely spaced. This large effect may

obscure systematics in the growth rate data. To remove noise effects and detect signal in growth rate, a sixth order polynomial was fit to the age-distance data using the POLYFIT function in OCTAVE. Growth rates were then calculated based on the polynomial, rather than the age-radius data themselves in order to remove some of the noise effects on the growth rates.

Mn-ages, growth rates, and radii of garnet porphyroblasts were compiled into a dataset that expresses the radius of each garnet at any given point in time during the growth duration. This dataset, along with the HRXCT data, was used to create an animation that exhibits the entire subvolume crystallization process. The animation was created using Interactive Data Language (IDL), and in it, one can watch the garnets nucleating and growing in real space over millions of years (App. 8).

Results

Whole Rock Mineralogy, Petrography and Chemistry

TD0914a was collected from the Pinney Hollow formation located on the west limb of the Athens Dome at the Townshend Dam spillway in 2009. The sample is a garnet-muscovite-paragonite-biotite-chlorite-plagioclase-quartz schist with accessory apatite and zircon (Fig. 17). Muscovite and paragonite form elongate crystals measuring up to 0.5mm. These two minerals make up 40% of the sample. Biotite and chlorite often occur together interbedded with quartz-rich layers. Another generation of chlorite crosscuts foliation. Biotite composes 20% of the sample whereas chlorite is 7%. Plagioclase, at 3% of the sample, occurs within both the quartz-rich layers and the strain shadows of the garnet porphyroblasts. In addition to forming schistose layers between biotite planes, quartz forms veins and depletion haloes around garnets (Fig. 18). Quartz quantity varies throughout the sample, being up to 50% locally as veins or 1-5% in schist.

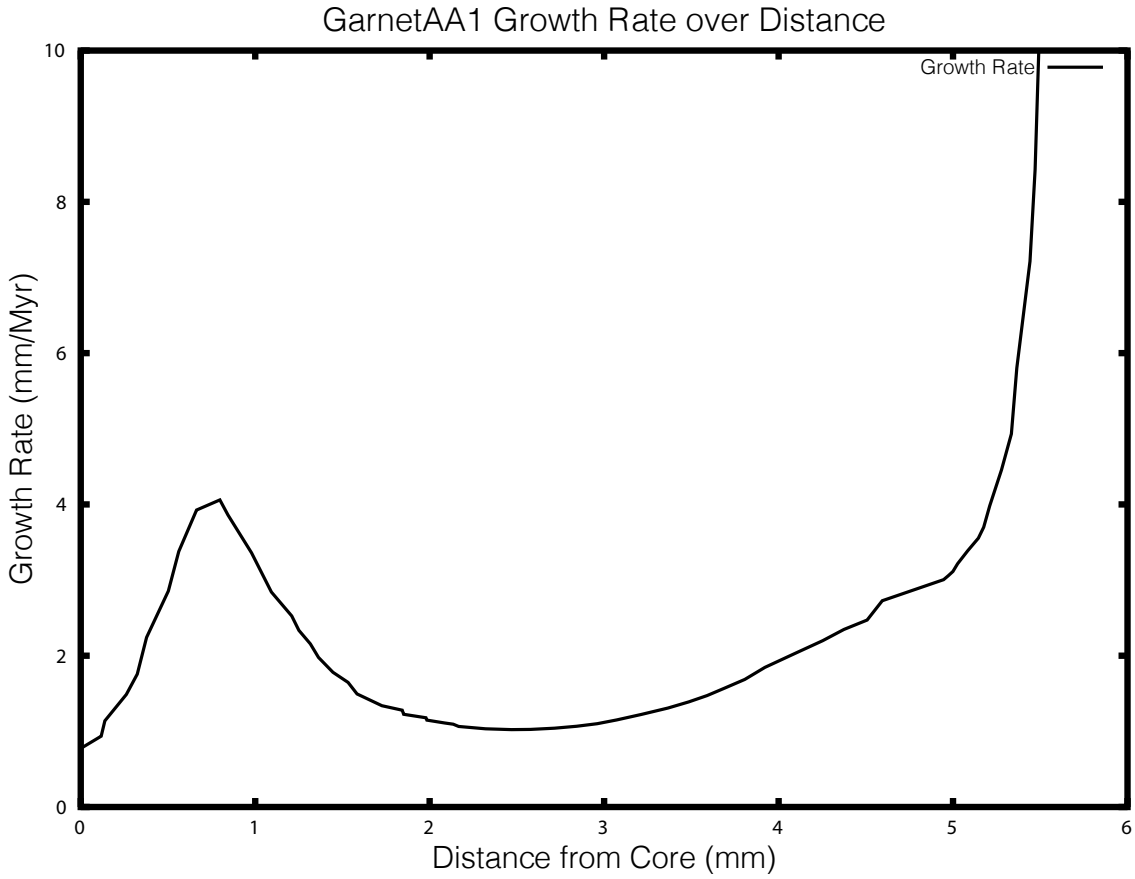


Figure 16. Example of an incremental growth curve where the growth rate is plotted against the distance from the core.

Chemistry and Geometry of Subvolume Garnets

From the kinetics subvolume 92 garnets were extracted. As mentioned above, the Townshend Dam was chosen as the locale for this project partially for the garnet size. Most of the garnets discussed in previous work at Townshend Dam had diameters greater than 100 mm. However, once manual extraction ensued for this project, garnets of much smaller diameter were discovered. Since the garnets were assumed to be mostly large, HRXCT data were collected at a low resolution. Distinguishing small garnets with diameters less than ~6mm from noise was impossible; therefore, manual extraction without the guidance of HRXCT imagery was the only way to discover miniscule garnets. Without imagery as guidance, the likelihood of losing unknown and unseen garnets is great.

Garnets in this sample are sub- to euhedral, ranging from 1mm-250mm in diameter. According to calculations using BLOB3D (Ketcham et al., 2005), garnet porphyroblasts compose 4.75% of the rock. A considerable number of these porphyroblasts display spiral inclusion trails with quartz as the predominant inclusion mineral. (Fig. 19) Numerous garnets are narrowly haloed by chlorite (Fig. 20), whereas quartz and plagioclase occur in the diffusion haloes more distally (Fig. 18). In some porphyroblasts, the chlorite appears to follow the shape and parallel the face of the crystal (Fig. 21).

The garnet in this sample is predominantly almandine (X_{Fe}=0.52-0.79). Grossular content is between 0.12 and 0.21 (X_{Ca}), and pyrope is from 0.03 to 0.13 (X_{Mg}). Within the 78 intact, mounted, and oriented subvolume garnets, X_{Mn} ranges from 0.01 to 0.26 in the core and 0.00 to 0.02 in the rim. In most garnets, major element zoning is regular with almandine and pyrope increasing and spessartine decreasing from core to rim. Grossular is more irregular with low values in cores, and increases in mantles before decreases at rims (Fig. 22).

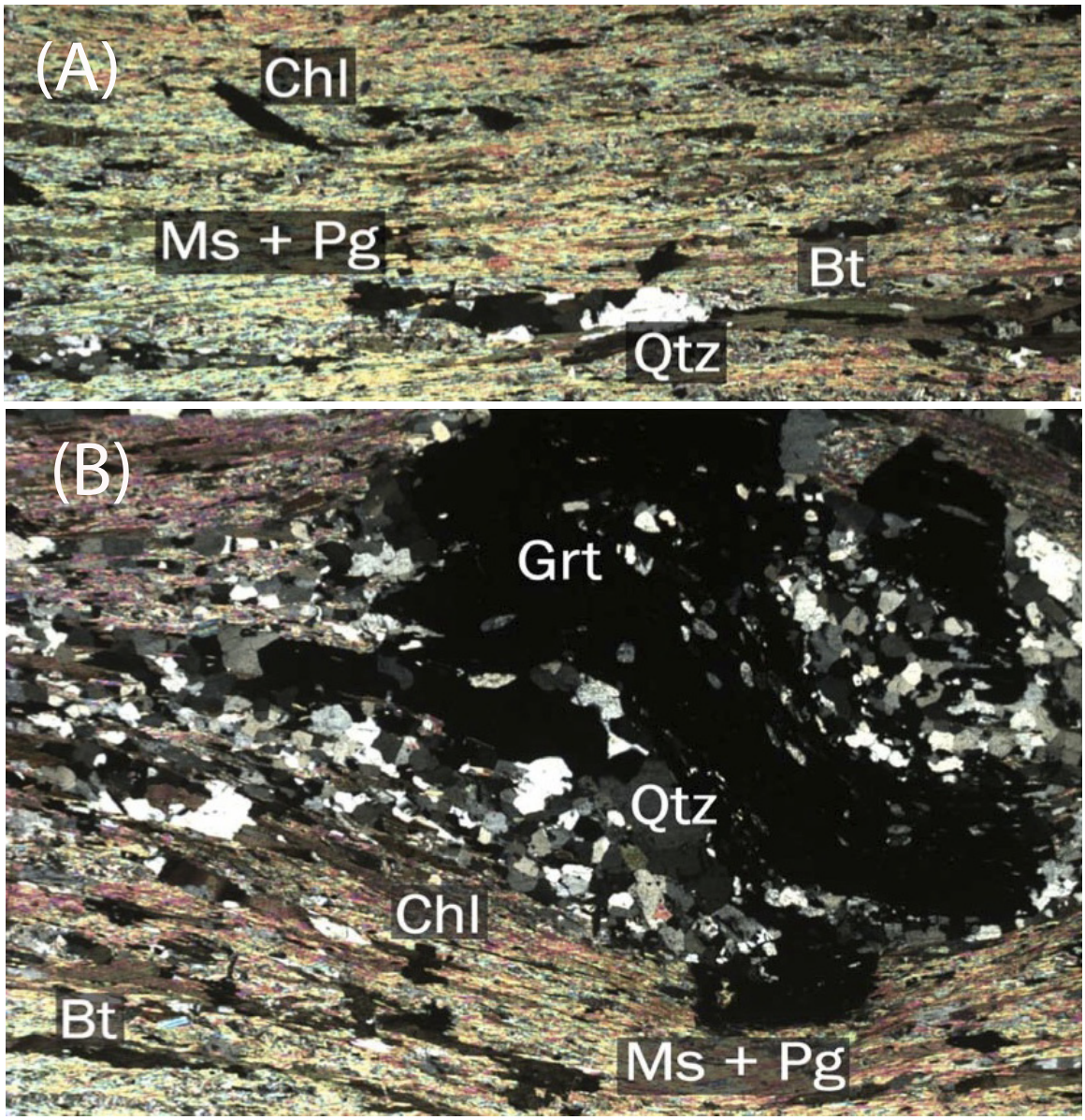


Figure 17. Photomicrographs of representative compositions and textures from TD074 in XP. View is 15mm across horizontally. A) shows blocky Biotite (Bt) with chlorite (Chl) cross cutting fabric. Muscovite (Ms) and paragonite (Pg) are intergrown and fine-grained. B) shows annealed quartz (Qtz) in the pressure shadow around garnet (Gt). Quartz grains are less annealed as inclusions in helicitic garnet. From Wright (2010).

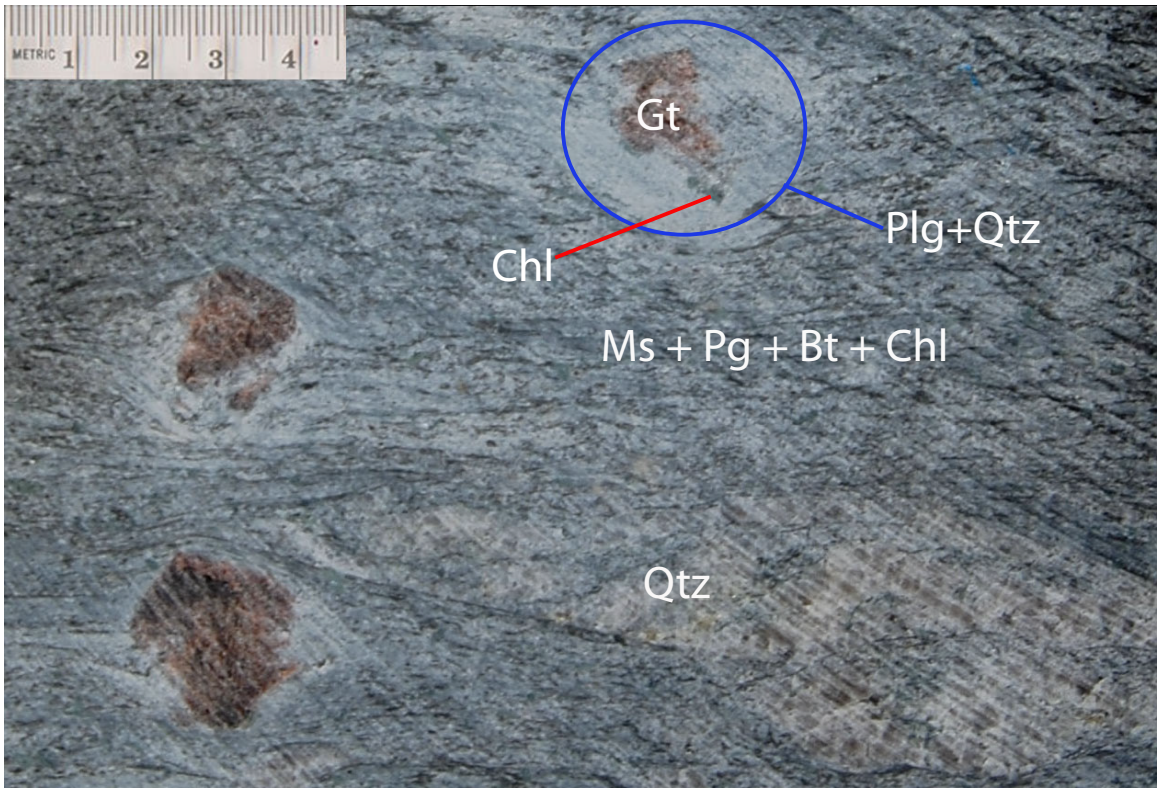


Figure 18. Hand sample scale image of subvolume from TD0914a. Image shows veins of Qtz and Ms + Pg + Bt + Chl matrix. The blue circle indicates Plg+Qtz depletion haloes around garnet porphyroblasts. Note the fleck of Chl adjacent to the porphyroblast.

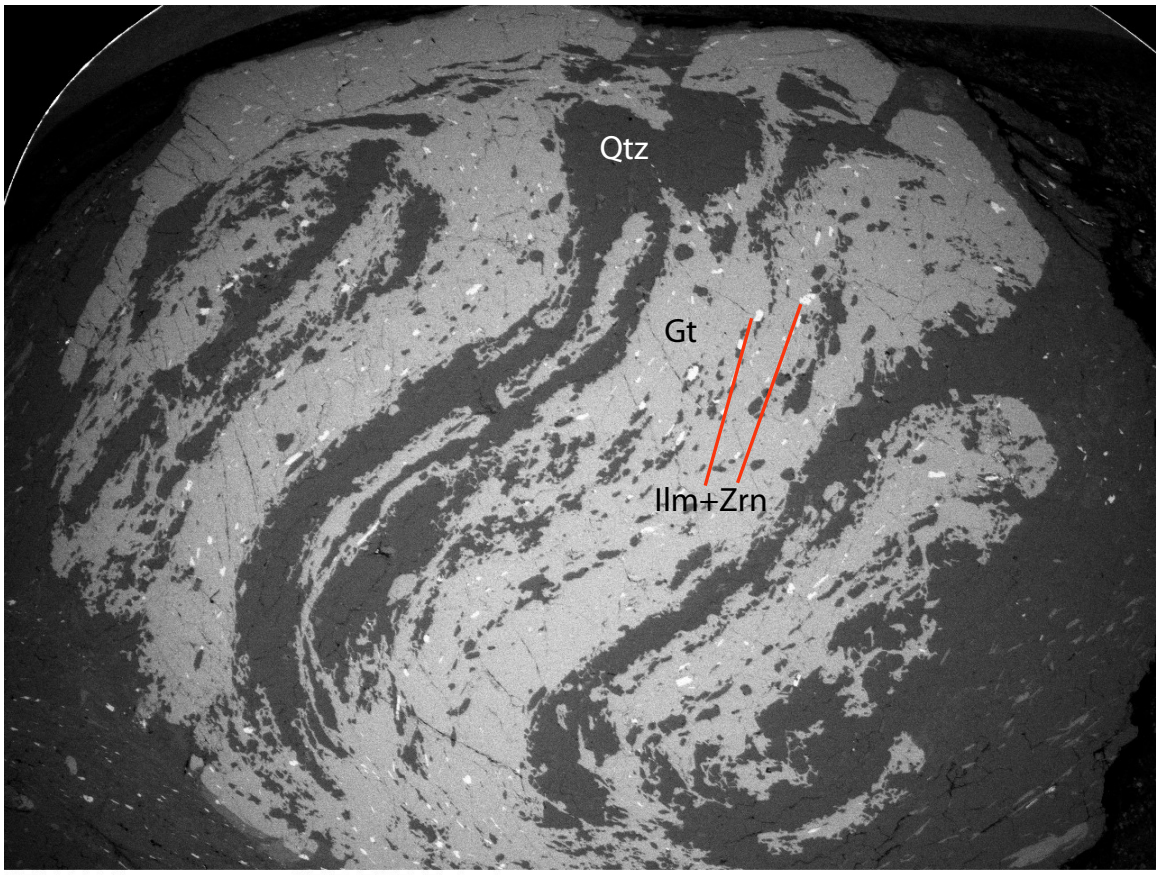


Figure 19. BSE image of garnet F. This snowball garnet has inclusions that are mostly quartz with smaller, less numerous zircon and ilmenite.

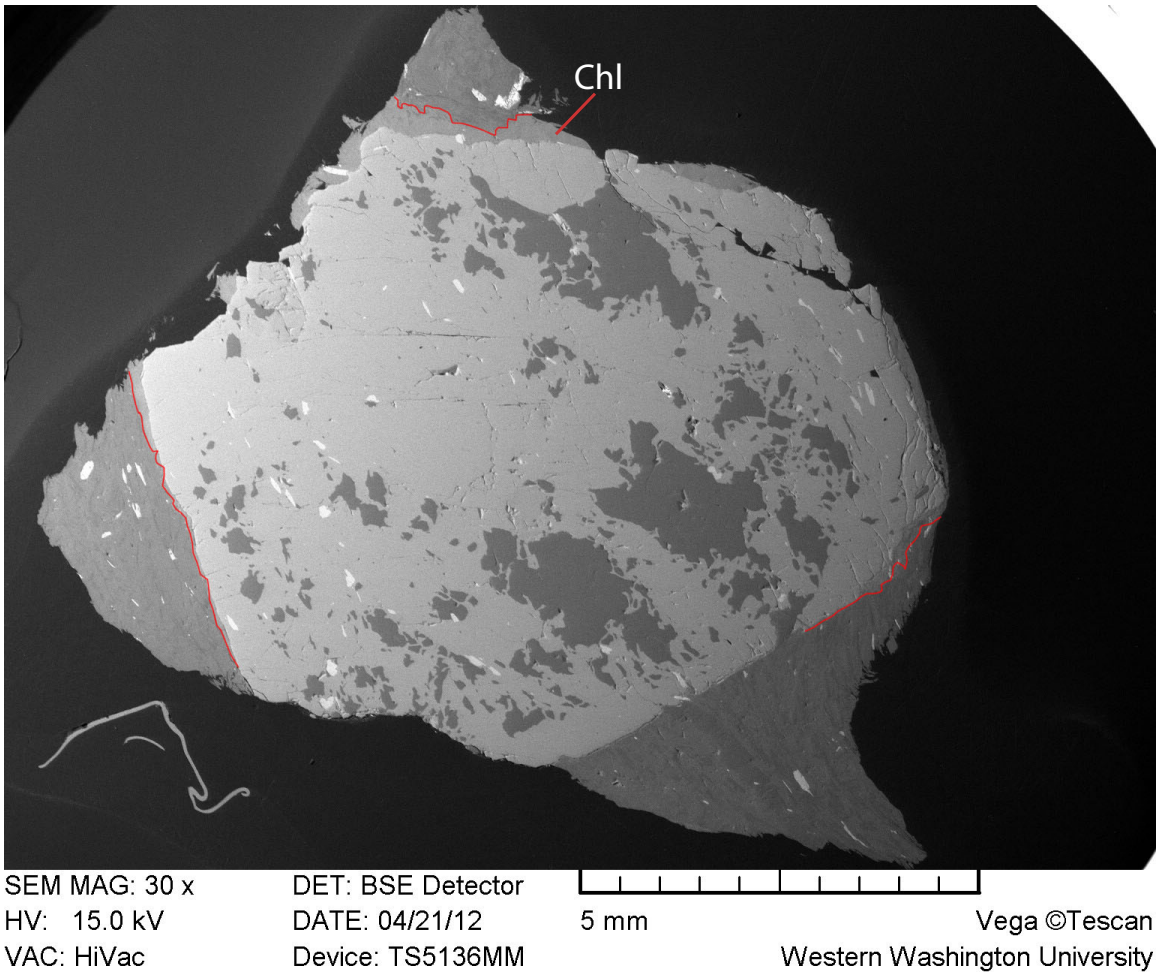


Figure 20. BSE image of garnet AT. Red outline highlights the chlorite halo closely encircling the garnet.

While most garnets have a smooth curvilinear decrease in Mn from core to rim, numerous garnets (e.g. garnets AC and BO) have a slight increase of X_{Mn} in the outermost edge (~30 μm) (Fig. 23). Many of the garnets with upticks have chlorite rims.

Not all garnet growth zoning is perfect. Samples with large densities of inclusions have traverses with gaps in radial distance. Additionally, inclusion-rich garnets have more noisy data. For example, Figure 24 shows how the inclusion trails influenced the path along which EPMA data were collected as well as the data. Because garnet F has large, curved inclusions trails, regular linear EPMA collection was impossible. Sections of the garnet had to be passed over, and pieces of the Mn zonation could have been missed. Patterns such as in garnet F are taken as an artifact of the snowball texture of the garnet, as well as a possible reading from an inclusion just below the surface, but not an irregularity in the garnet Mn fractionation pattern.

Numerous garnets from the subvolume show slightly irregular zoning. Garnet BM has one traverse with smooth Mn growth zoning, but the second traverse is quite different (Fig. 25). The second traverse shows a decrease in Mn from core to mantle, but then at about 4 mm from the core, the Mn values increase slightly, flatten out, and then increase again before smoothly decreasing toward the rim.

Another garnet with an imperfect zoning pattern is garnet BT (Fig. 26). This garnet shows no regular X_{Mn} zoning at all, and the point with the highest X_{Mn} value is nowhere near the morphological center.

Sm-Nd Ages

Dragovic, Gatewood, and Baxter dated 38 zones based on Mn content from ten garnets using Sm and Nd isotopic analysis. Nine of these garnets were from TD0914a. One was from TD0914b, a sample just up-section from the sample used in this study, separated from TD0914a by a foliation plane. Garnet samples from this study are numbered 1-16 (not all extracted garnets were dated) with *a* representing TD0914a

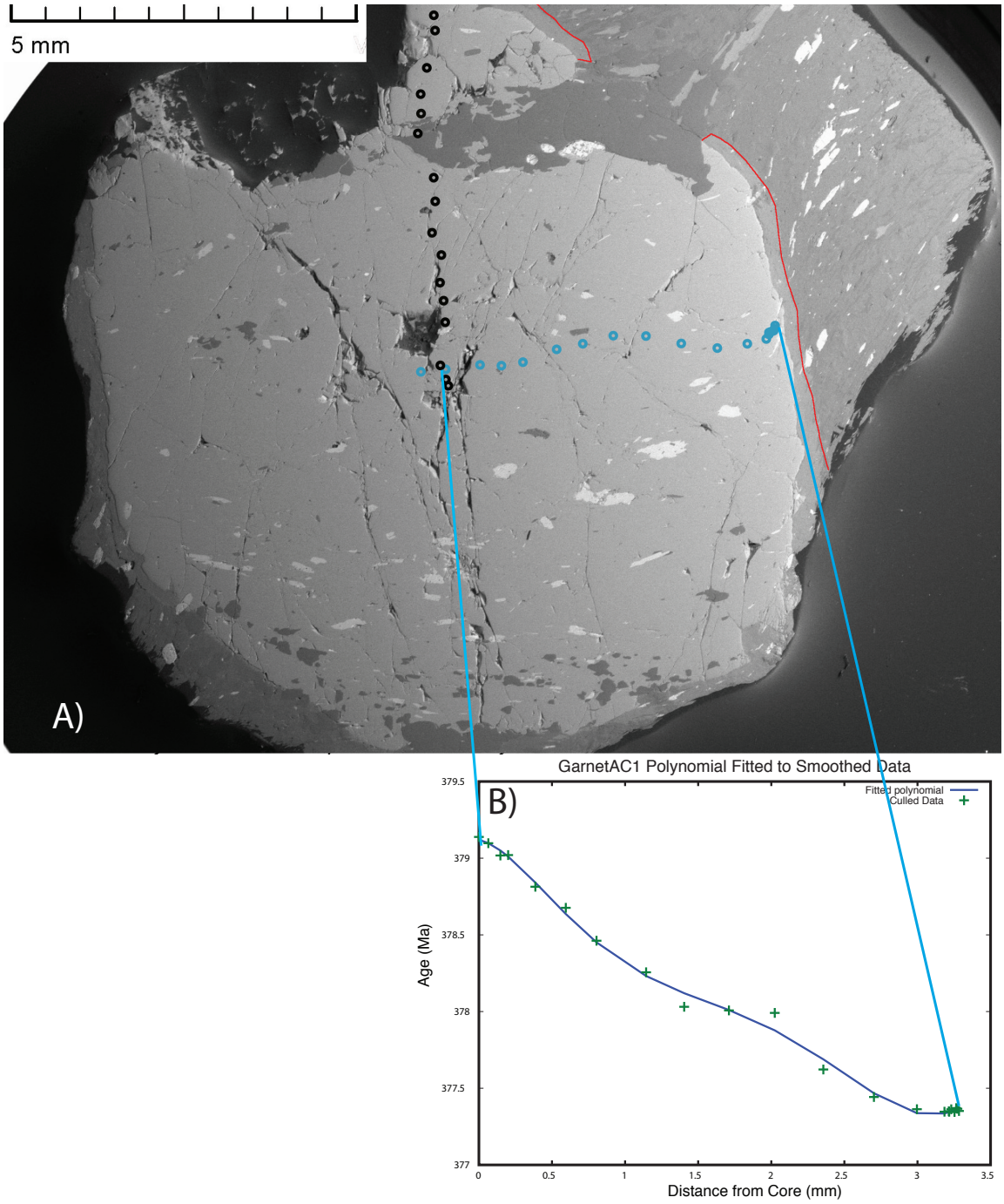


Figure 21. Garnet AC exhibits chlorite rims that are inferred to trace subhedral garnet faces (chlorite outlined in red). A) BSE image of Garnet AC with microprobe traverses plotted. Yellow ellipses represent EPMA measurement points. B) shows growth zoning for traverse T-T', where age decreases with distance from the core, excepting the uptick at the outermost rim.

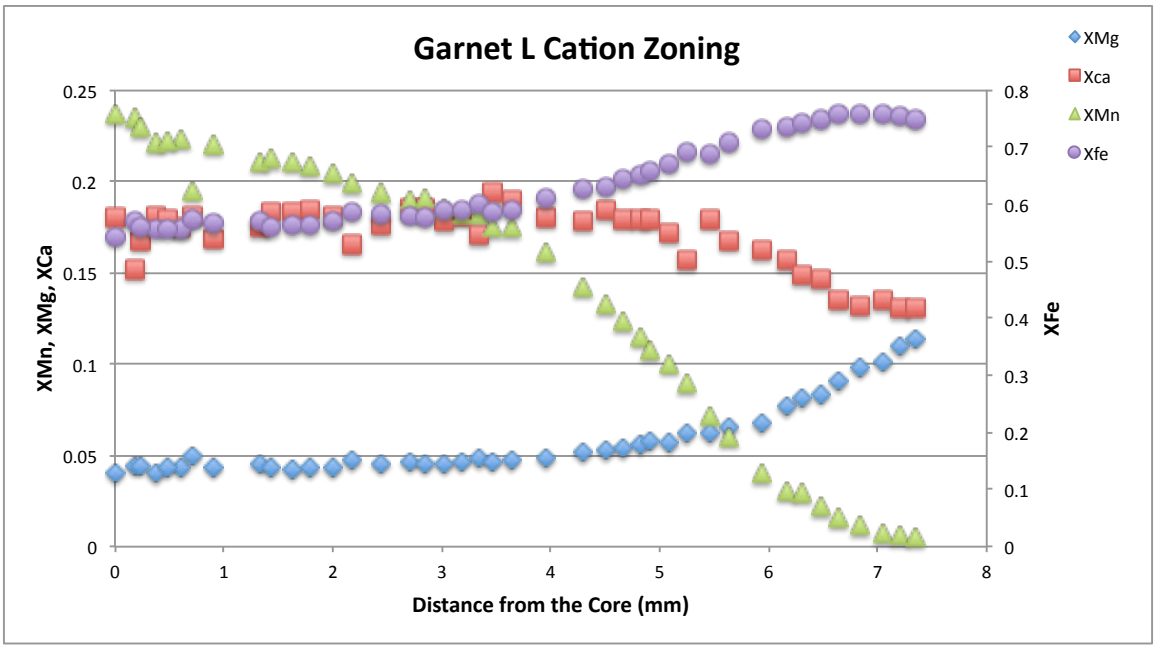


Figure 22. Garnet L traverse exhibits normal major element growth zoning.

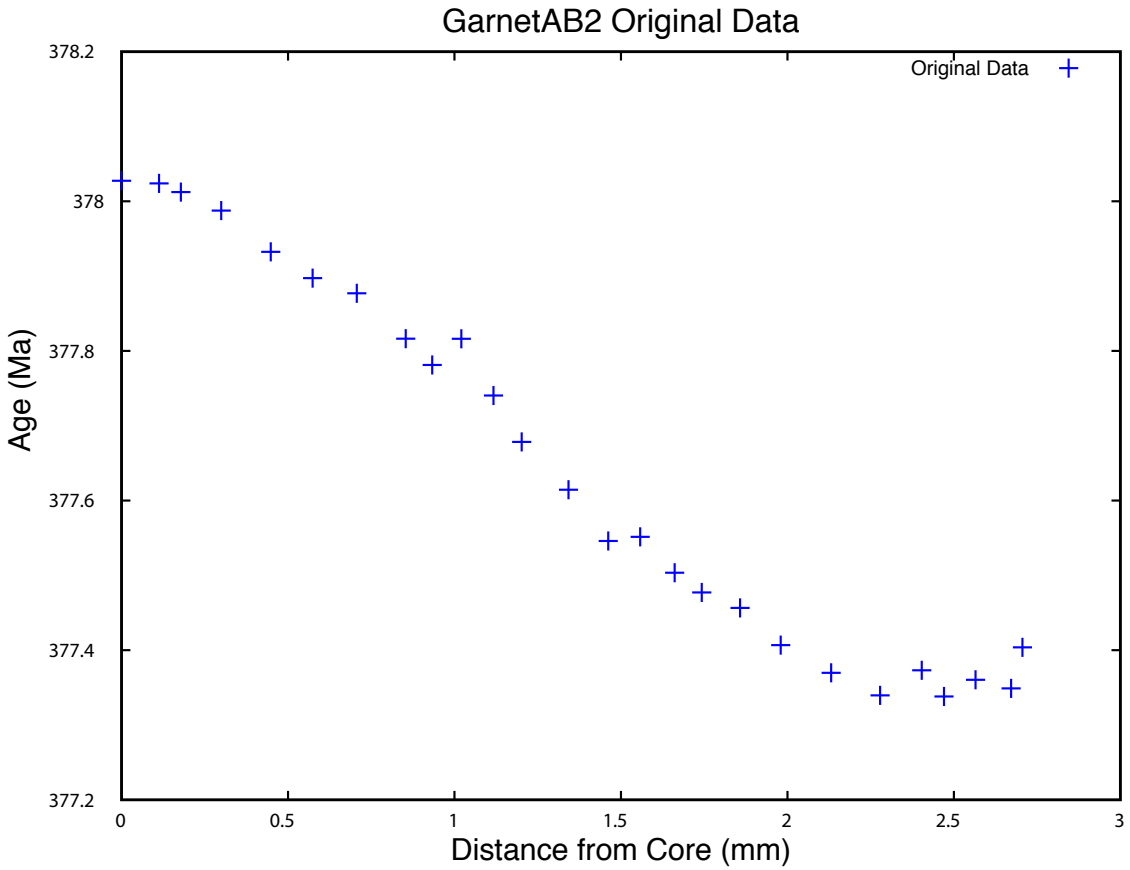


Figure 23. Age versus distance graph for garnet AB traverse 2. These data are unculled, and show a good example of an uptick at the rim.

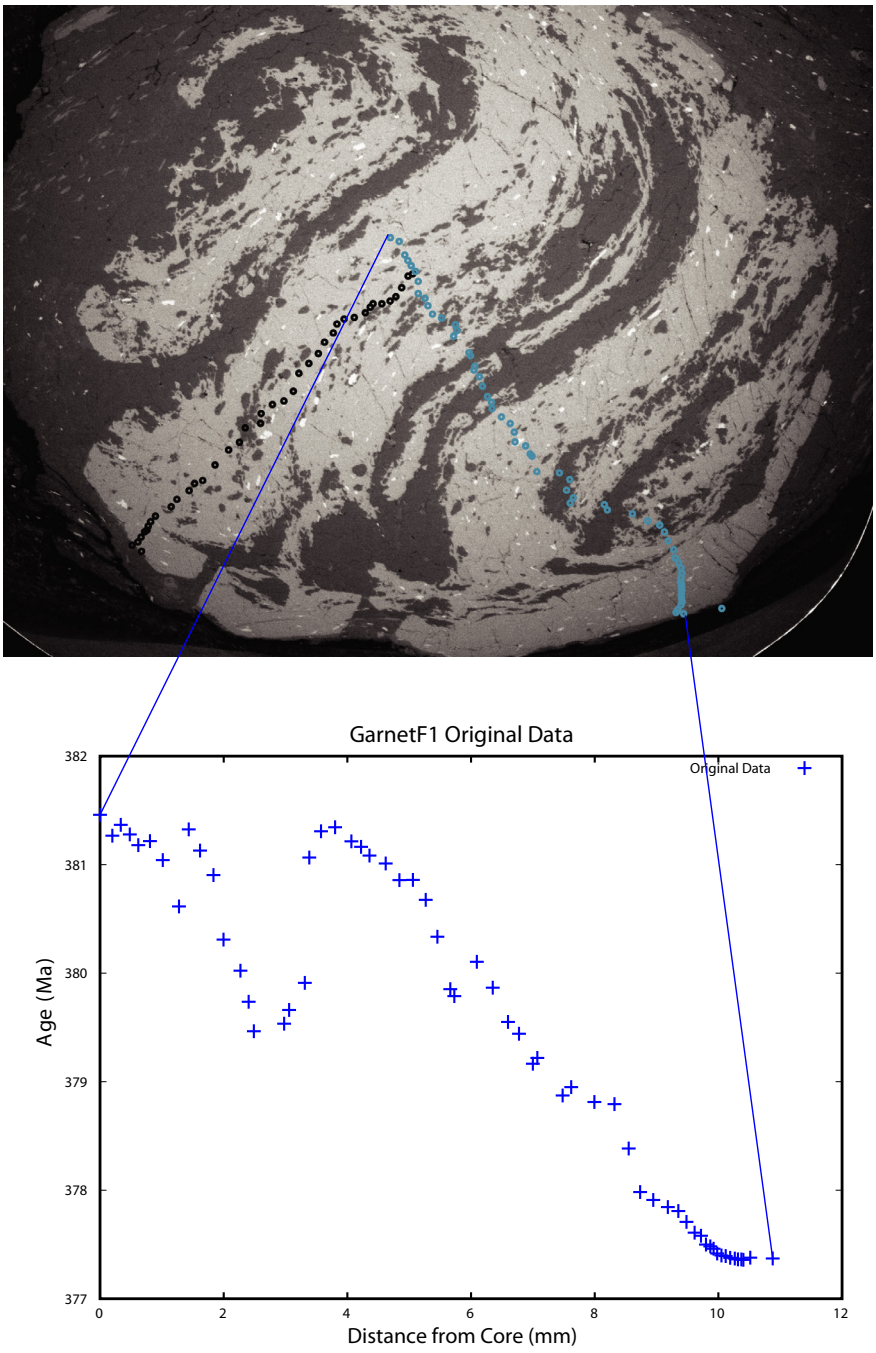
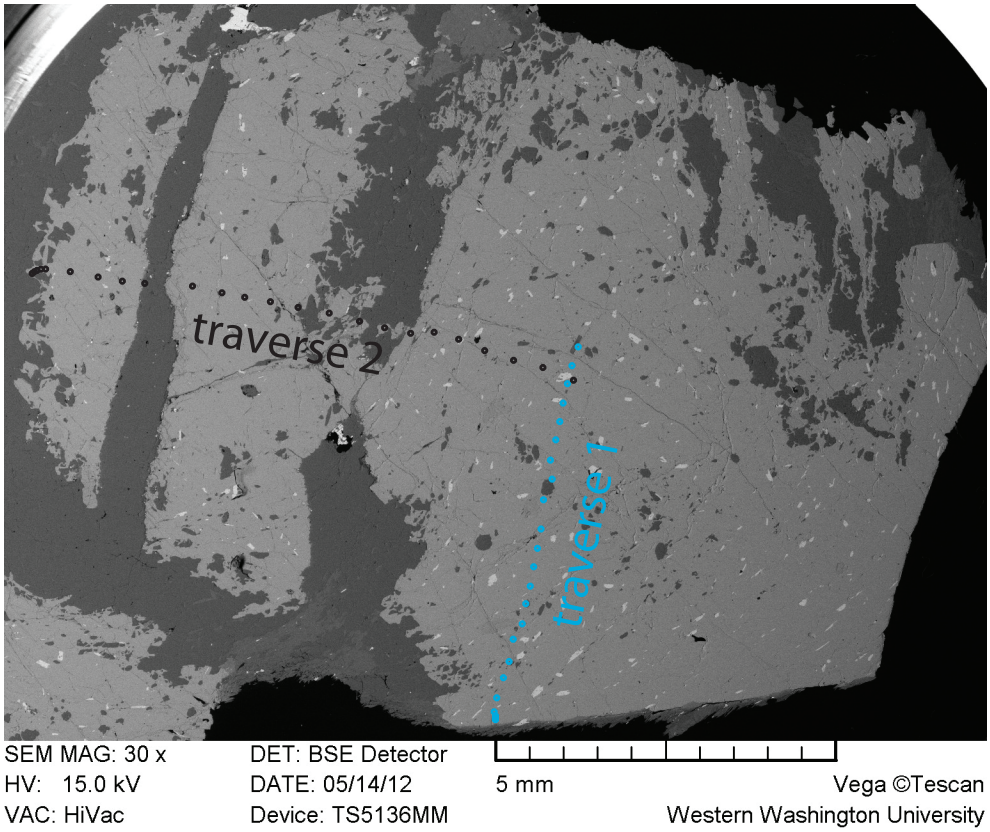


Figure 24. Example of a poorly-behaved garnet. Zero in graph marks the core of the garnet, and the traverse continues to the top left of the garnet. Garnet F shows "messy" data with a poor Mn vs distance relationship toward the core. This is most likely caused by the large number of inclusions.



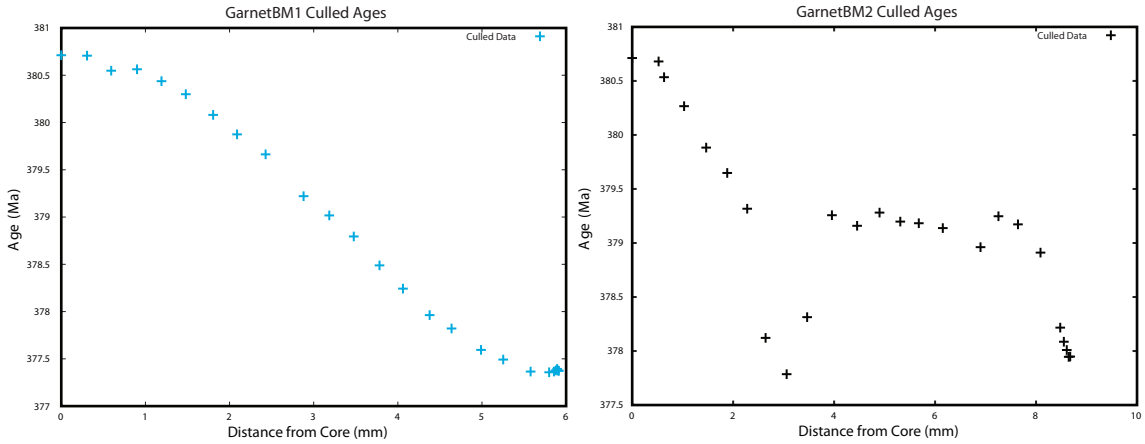


Figure 25. BSE image of garnet BM with EPMA traverses and Age-Distance curves. A jump in garnet age (XMn) at 4 mm from core in the second traverse could be caused by garnet clustering. Because the zoning increases at 4mm and then decreases smoothly afterward signifies that this may be two garnets clustered together. This clustering could explain the abnormal shape of garnet BM.

and *b* representing TD0914b. In addition to these ten garnets, two bulk samples of small garnets measuring 3-4mm and 1mm in diameter were analyzed to constrain the end of garnet growth.

Sm-Nd dated garnet samples with Nd concentrations > 0.2 ppm and $^{147}Sm/^{144}Nd$ ratios < 0.75 (cores from garnets 3 and 9, zone 2 from garnets 3 and 4b, and zone 3 from garnet 4b) were removed *a priori* due to the possible contamination from inclusions like clinozoisite and apatite (Gatewood, 2013). The core and mantle of garnet 3 also had a strange sulfuric acid gel form during partial dissolution, further motivation for removal of the data from these samples. After removing the above samples, 32 sampled zones remained. Considering these 32 samples, garnet Nd concentrations range from 0.03 to 0.18 ppm. Little radial Nd variation occurs in these samples. The remaining samples had $^{147}Sm/^{144}Nd$ ratios, that range from 0.8 to 3.2 (most samples are greater than 1) and increase from core to rim in most garnets.

Matrix samples that were collected directly adjacent to dated garnets and whole rock samples were also extracted for the Sm-Nd dating processes. The isotopic compositions of these samples were determined, and, the samples showed considerable $^{147}Sm/^{144}Nd$ variation throughout the entirety of TD0914a. In order to calculate ages for each Mn-specific zone, the $^{147}Sm/^{144}Nd$ isotopic composition of each garnet segment was paired with the matrix directly adjacent to form a two-point isochron (Table 1, Fig. 10). Because of the variation in the isotopic composition of the sample, another approach could have been taken to calculate the Sm-Nd ages of each segment. This alternative would entail grouping each garnet segment with all matrix and whole rock samples to calculate the age. This method could account for the cm scale heterogeneity within the sample; however, this thesis used the two-point isochron method instead, culling the scatter in order to establish the Mn-age relationship.

After removing dates as described above, an unanticipated dataset was left.

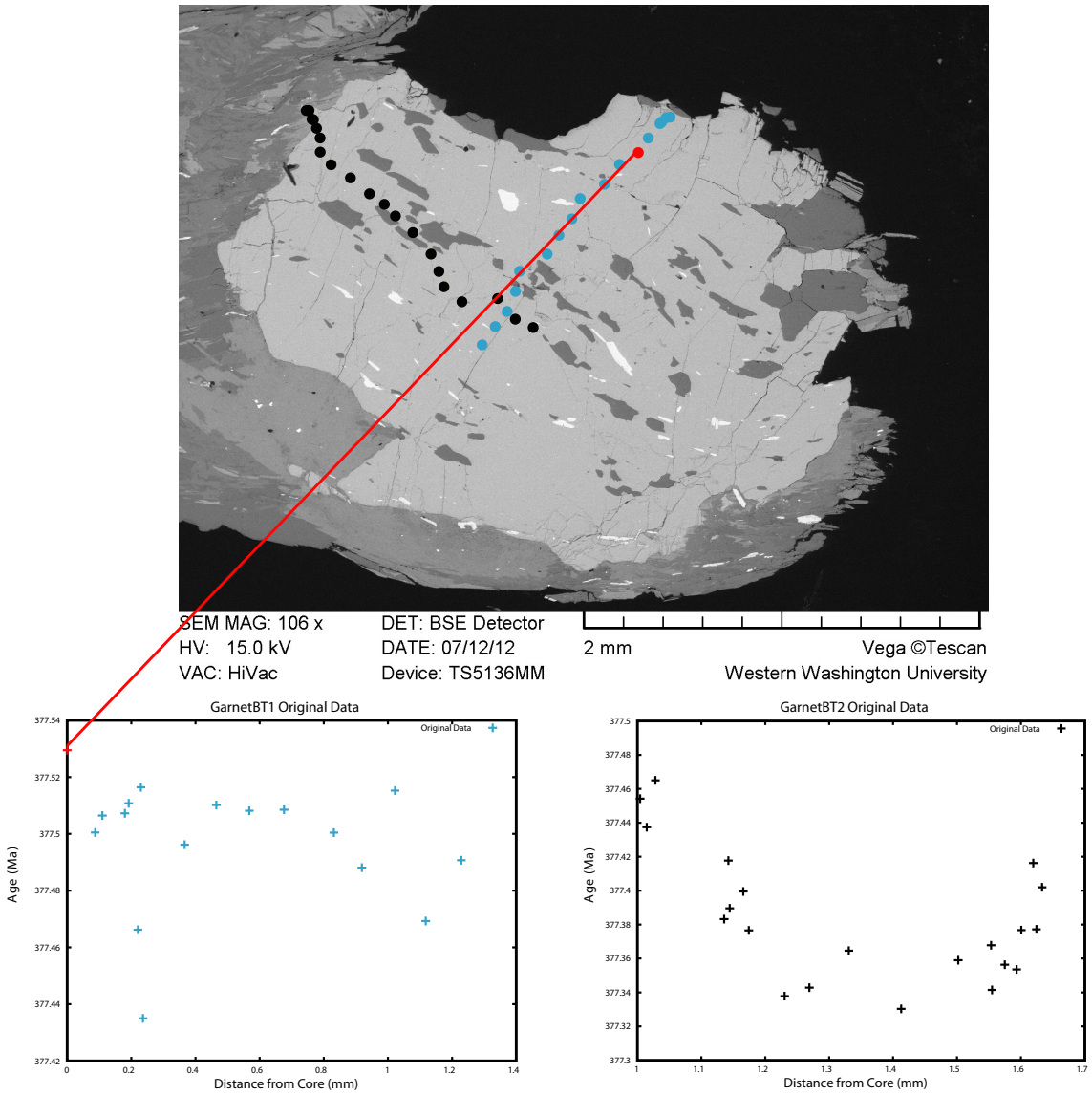


Figure 26. Garnet BT and corresponding age-distance data for both traverses. Note the lack of smooth bell-shaped curves in each traverse. Red line connects the highest XMn value and oldest age with the point on the traverse where it was measured.

Many ages were younger than expected compared to ages obtained by Christensen (1989). Figure 27 shows core ages only. When considering these core ages, one can see there is up to ~80 million years of discrepancy between nucleation ages. Though a range in age of nucleation of garnets may be expected, one would anticipate that the end of garnet growth would occur at approximately the same time. However, figure 28 shows otherwise. Figure 28 exhibits a range in rim ages from 380 to 349 Ma. Because a 31 million year span in primary garnet growth termination is unlikely, this dataset has been reduced to more closely represent the primary growth phase of the garnets. Points were removed based on the size of uncertainty and chronological logistics. For example, figure 29 shows the point in Garnet 13 with highest X_{Mn} does not yield the oldest age (i.e. the core is not the point with the oldest age). This core analysis, along with others having a similar pattern, was removed from the dataset used to calculate the relationship between Mn and time. Non-rim garnet zones with ages less than the 1mm garnet group (374.9 ± 1.22 Ma) were removed because the 1mm garnet age was considered to represent the end of garnet growth. These zones were Garnet 4 zone 2, Garnet 8 zone 4, and Garnet 10 zones 1-2. In addition, rims from Garnets 10, 3, and 16 were removed because they were 5+ million years younger than the 1mm group age. Other garnet zones removed for reverse Mn/age correlation are as follows TD09140b Garnet 3 zone 3, TD0914a Garnet 4 zone 3, TD0914a Garnet 4b zone 4, TD0914a Garnet 8 zones 5-6, TD0914a Garnet 10 zones 1-3, and TD0914a Garnet 13 zone 1. After removing all of the unreasonable zones, 19 dates were left in the dataset. Figure 30 and Table 3 contain the reduced dataset.

Mn-Age Relationship

Regardless of the variable manipulation, attempts at modeling equation 6 were to no avail, and the equation did not converge with the data. Numerous variables involved in the derivation of this relationship could have affected the applicability of this model. First, the assumption that the relationship between temperature and time is

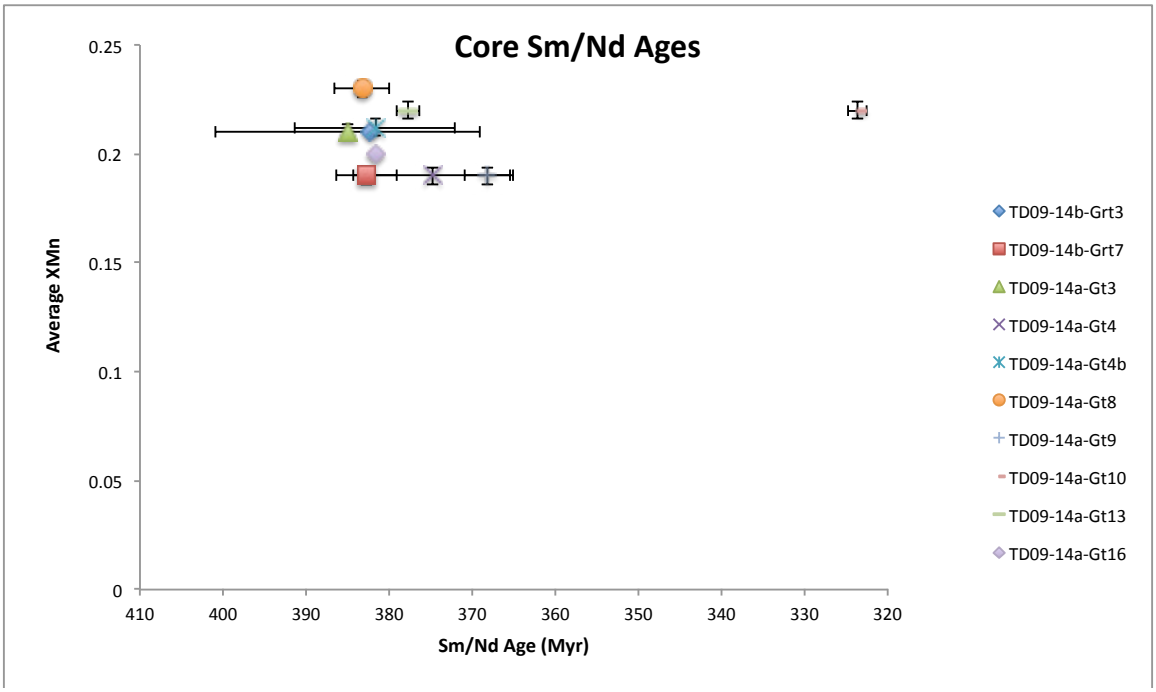


Figure 27. Sm/Nd ages of only core samples. Note the gap in age between garnet 10 and the rest of the samples.

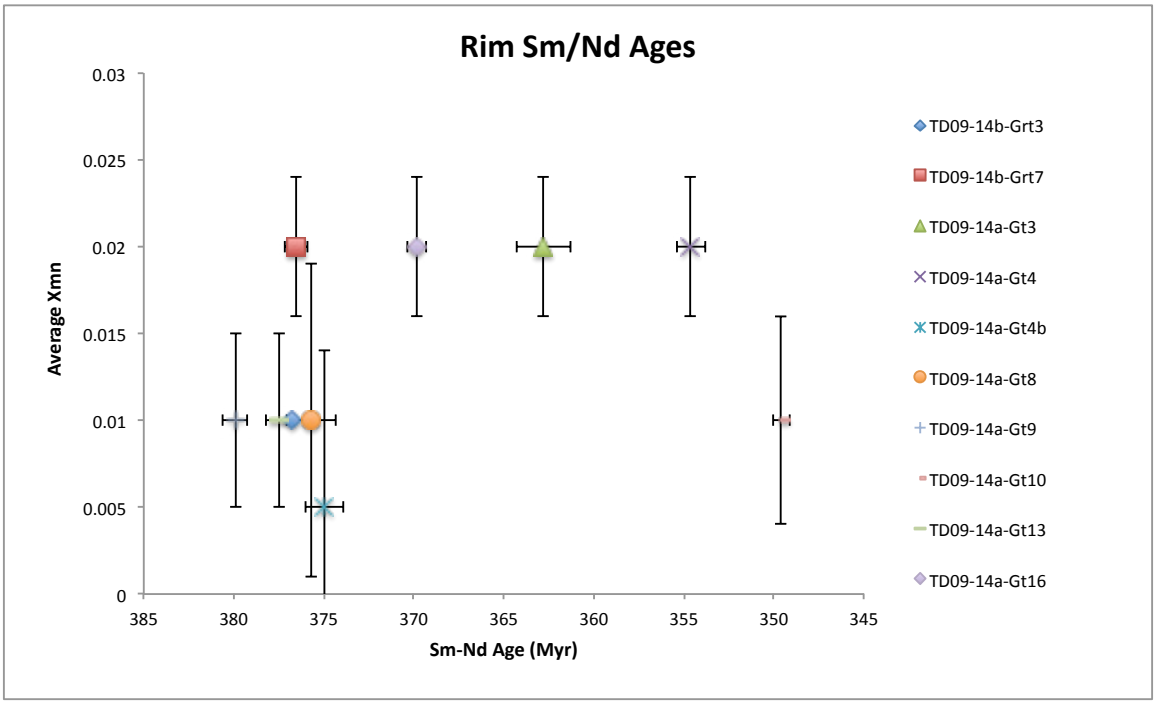


Figure 28. Sm/Nd ages of rims only. Note >30 million year gap between rim ages.

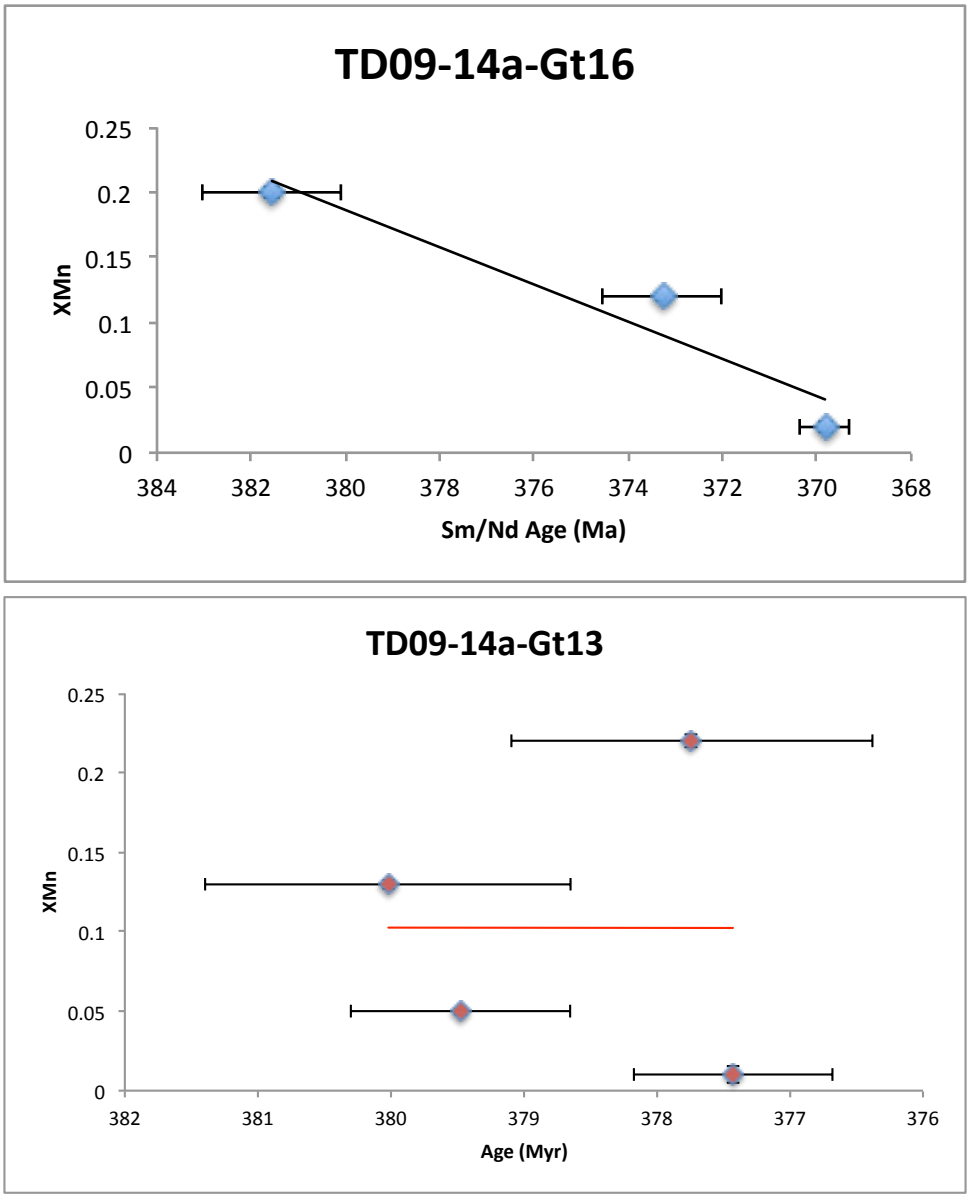


Figure 29. The relationships between XMn and age in garnets 16 and 13. Garnet 16 shows a good example of the younging of Sm/Nd age with decreasing XMn. The blue line represents this trend. Garnet 13 is not so well behaved. The Sm/Nd age of the core is the youngest, though it has the highest XMn value. The mantle zones increase in Sm/Nd age before decreasing at the rim. The red line represents the "relationship" between XMn and age; that is, there is no increase or decrease in age with decreas- ing XMn. This is an example where the outlier core point was removed from the dataset before establishing the Mn-age relationship fit.

linear could be overly simple. The relationship may be far more complex, making the representative equation even more so. When running the XRF data through Perple_X, I did not account for garnet fractionation (Baxter and Caddick, 2013). This could have affected the results of the model and could possibly have produced a form of an equation that better fitted the data. Also, because the rock shows signs of inhomogeneity, the availability of Mn throughout the sample could have changed, affecting the overall relationship between Mn and time. Though a fit of the equation to the Mn and Sm-Nd data could reveal more about the geological environment in which the garnets formed, like the approximate temperature and pressure at the onset of garnet nucleation, this method of data-fitting had to be abandoned.

Though overly simplified, a linear relationship between Mn and time was assumed after the failure of the modeled function. As described in the Methods section, this weighted least-squares fit uses WTLS_LINE_OFFSET (App.). The calculated Mn-age relationship is

$$Age = 2\text{E}1\left(+\frac{16}{-6}\right)Ma(X_{Mn}) + 379.3 \pm 0.1\ Ma \quad (7)$$

and full statistical results are provided in table 5. Figure 31 shows the Mn-age equation plotted with a 2σ envelope on the reduced age dataset.

Nucleation and Growth Durations

The nucleation duration for the entirety of the kinetics subvolume was calculated as the difference between the age of the oldest core and the age of the youngest core. Garnet AV has the oldest core at 382.2 ± 1.0 Ma and the youngest garnet, BT, nucleated at 377.5 ± 0.3 Ma. Therefore, the nucleation duration for the kinetics subvolume from TD0914a is 4.7 ± 2.6 Myr.

The growth duration of the kinetics subvolume is calculated much the same, except the youngest rim and the oldest core are considered. The nucleation age of garnet

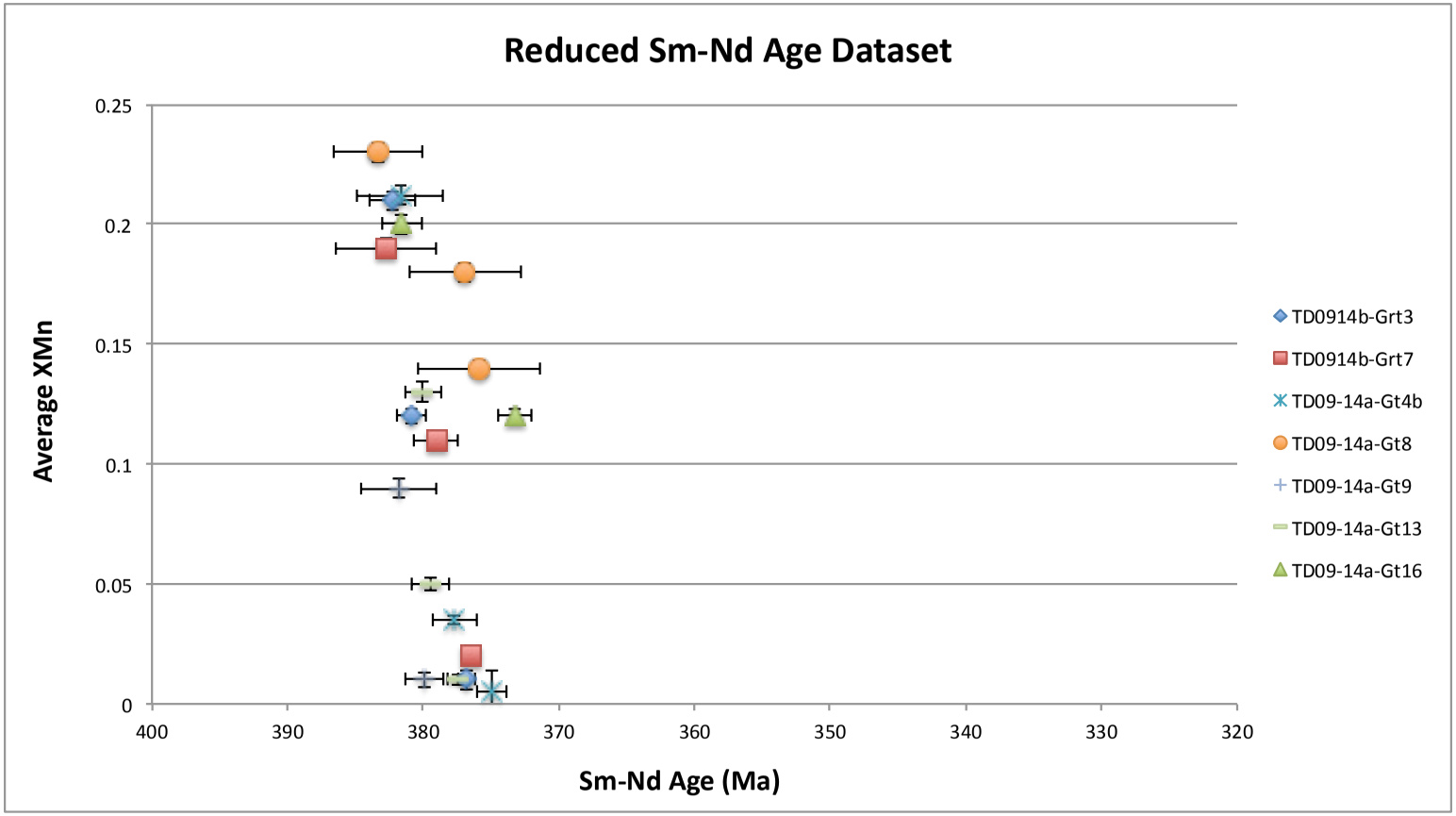


Figure 30. Culled Sm/Nd dataset that is assumed to represent the timespan of primary garnet growth.

AV once again is 382.2 ± 1.0 Ma, and the garnet that stopped growing last is BP at 377.3 ± 0.4 Ma. The duration of growth is therefore 4.9 ± 2.7 Myr.

Growth Rates

Incremental growth rates span from -500 to 500 mm/Ma. However, negative growth rates are impossible, and growth rates larger than 10 mm/Myr are improbable, given the growth duration of 4.9 ± 2.7 Myr along with maximum garnet radius being 11.1 mm. Therefore, this project did not consider samples with these improbable growth rates. Many of the unreasonable growth rates occur either at the core or the rim of the garnet. As previously mentioned, numerous garnet rims have upticks in the Mn value, which would have an odd effect on the growth rate curve. These upticks are not considered to be part of the primary growth phase; therefore, their effect on the growth rates will also be disregarded. Many garnets have noise in the core, and the nature of the sixth-degree polynomial which was fitted to the age-distance data could create extreme core values.

While the extreme numbers may not be likely or real, there are common trends in the garnet growth rate curves (Fig. 32). For example, garnet traverses AA1, AB3, and BB1 have a rapid increase followed by a decrease in growth rate within the first third of garnet growth. Garnet traverses can have up to three "bumps" in growth rate—beginning third, middle, or last third of growth. Some only have the first, some only the second, some only the last, along with every mix between.

Nucleation Rate

The nucleation rate of a sample is the number of nuclei per Myr per cubic centimeter. Though EPMA data was collected on traverses of only 78 garnets, 92 garnets were extracted from the kinetics subvolume. The latter number was used for the nucleation rate calculation. The kinetics subvolume was measured to be 3940 cm^3 using HRXCT and REDUCE3D (Hirsch et al., 2000), although this may be an underestimate.

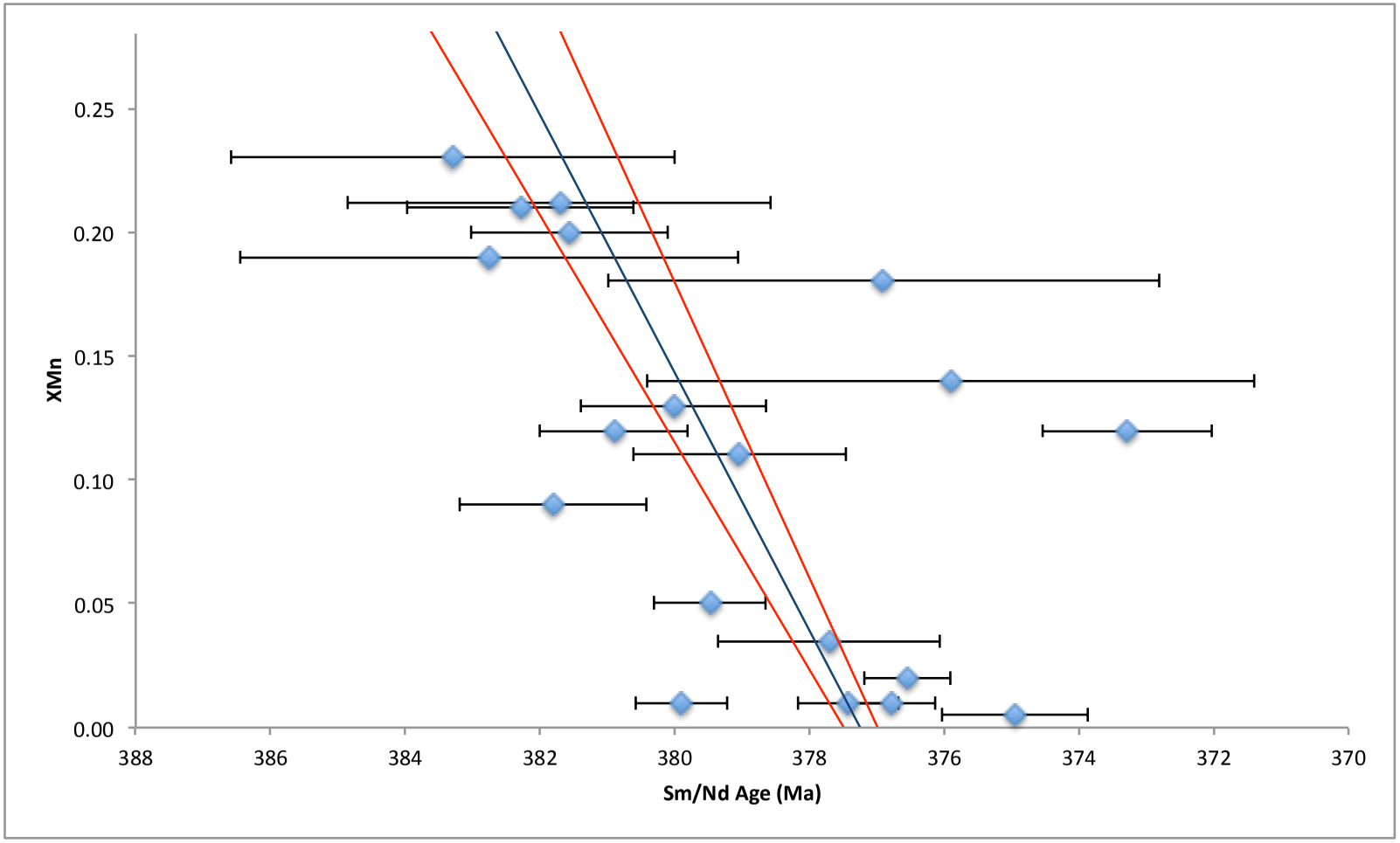


Figure 31. Mn-age equation plotted with the reduced age dataset. The best fit line is blue with ±2σ error in red. This equation was used to indirectly date EPMA data using the XMn value of each point.

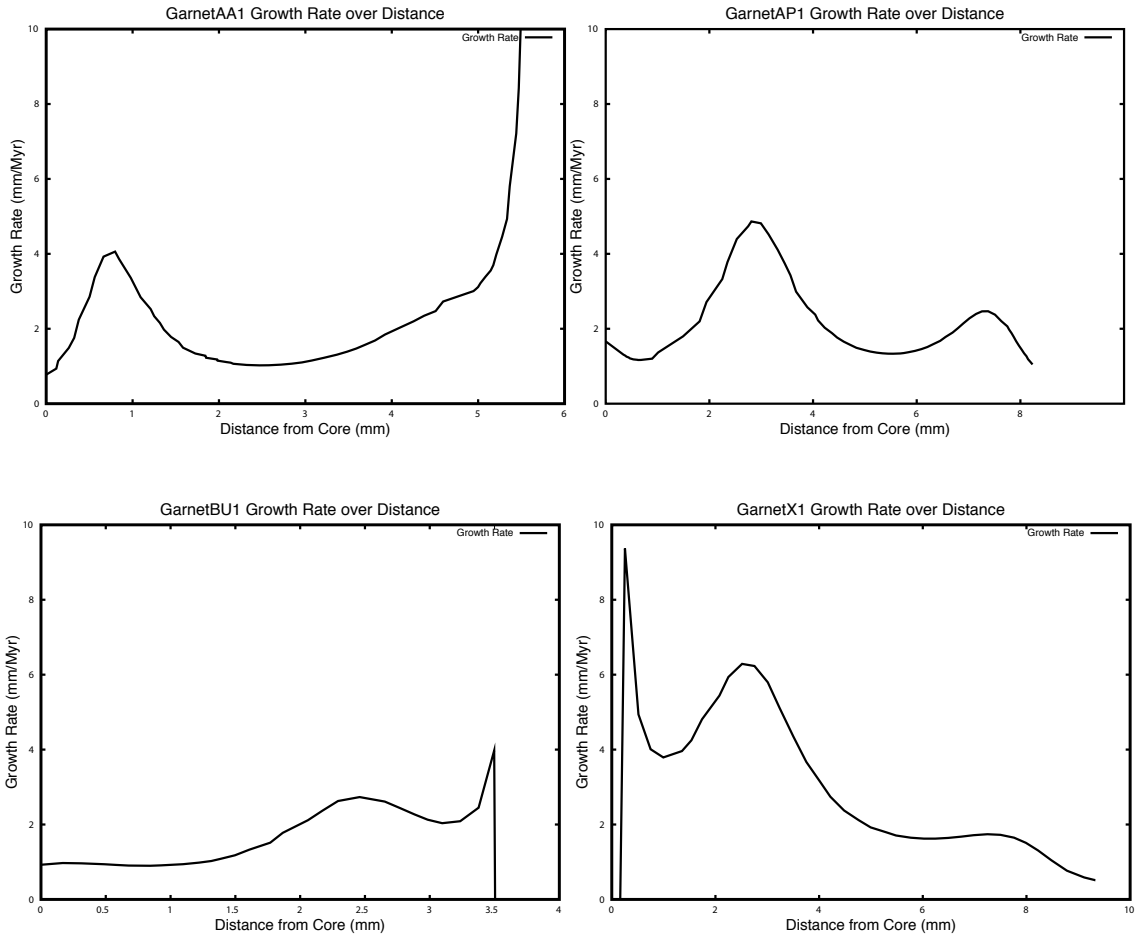


Figure 32. Example incremental growth rate curve patterns. Clockwise from top left: garnet AA traverse 1, garnet AP traverse 1, garnet X traverse 1, and garnet BU traverse 1. These patterns are the most common throughout the kinetics subvolume.

So, if the nucleation duration is 4.7 ± 2.6 Myr, then the nucleation rate for the sample is 0.005 ± 0.002 nuclei/Ma/cm^3, or approximately one nucleation event per cubic centimeter per 200 Myr. Considering the possibility that there were numerous miniscule garnets that were lost during the extraction process, the calculated nucleation rate for the subvolume is likely a minimum estimate.

Error Analysis

The largest source of error in this project lies in the uncertainty of the $^{147}Sm/^{144}Nd$ age data. Reported uncertainties (Table 1) are the 2σ calculated values of isochron ages. Two sigma error is calculated for each age by incorporating the greater error of either the the internal or external precision of each point into the fit for the slope of the two point isochron.

The slope (α) of the Mn-age curve, is the primary uncertainty that is important for kinetics interpretations. Figure 31 shows the 2σ error of the fit of the Mn-age curve. Uncertainty in the position of the line does not contribute to kinetics conclusions. The slope is 5.20 x 10^{-2} radians with a variance of 1.37 x 10^{-4} (Table 5).

When it comes to major influences on the Mn-age curve accuracy, uncertainty lies in the values of age and X_{Mn}; however, the uncertainty in the age overwhelms the uncertainty of the X_{Mn}. Figure 33 shows the effect of EPMA analytical error for an example garnet. The error in the EPMA measurements stands as the relative error, whereas the error in the Sm/Nd age is the absolute error. The average effect the analytical error has on the Mn-age of the points is ± 0.06Myr. While the uncertainty in the Mn data has a small effect on the age of each point, as well as the growth and nucleation durations, it does not influence the incremental growth rates (Fig. 33). Because the age of each point in every subvolume garnet is calculated based on the Mn content, the error in the Mn measurement is that which is considered the dominant error for the kinetics calculations such as nucleation rate, age of nucleation, growth rate, etc. For example,

in two Mn values that are the nuclei of two garnets, error in the Mn-age curve would make these two nucleation events younger or older by the amount of error in the Mn-age equation; however, the difference between their two ages would stay the same. The error in the EPMA Mn measurement would affect the ages of each nucleation event relative to the other. That error is mentioned above as ±0.06 Myr; therefore, the age of nucleation of any garnet is the Mn-age of the highest Mn value ±0.06 Myr.

Other potential, yet unquantifiable, sources of error in this project could come from the possible inaccuracy in assuming that the geomorphic center of the garnet is the actual nucleus or core. Because the garnets were extracted from the rock, sectioning through (or very near) the geometric core was straightforward. Through X-ray mapping the likelihood of identifying the compositional core (highest-Mn point) increased; however, at its very largest field of view, the SEM at WWU could collect a chemical map of an area measuring 30x30 mm. The largest garnets are up to 250 mm in diameter. This means that in order to find the compositional core, an approximation of the geometric core was made and multiple maps had to be collected, in the vicinity of the geometric center of the central section. Also, because the EDS X-ray maps are qualitative, the comparison between multiple qualitative maps of large garnets to find the highest Mn value proved difficult. The difficulty in finding the actual core of the garnet could affect the age of nucleation, the duration of growth, and the growth rates. If the chemical core of any given garnet had a higher Mn value than what was measured, the shape of the Mn-distance relationship could be steeper. Also, if the oldest garnet had a more Mn-rich core and thus an older age than calculated, then the nucleation duration would be larger and the nucleation rate smaller.

However, as previously mentioned, there were numerous small garnets that were lost, broken, or never removed during the extraction process. Because these could not be incorporated as nucleation events, the approximate nucleation rate could be higher

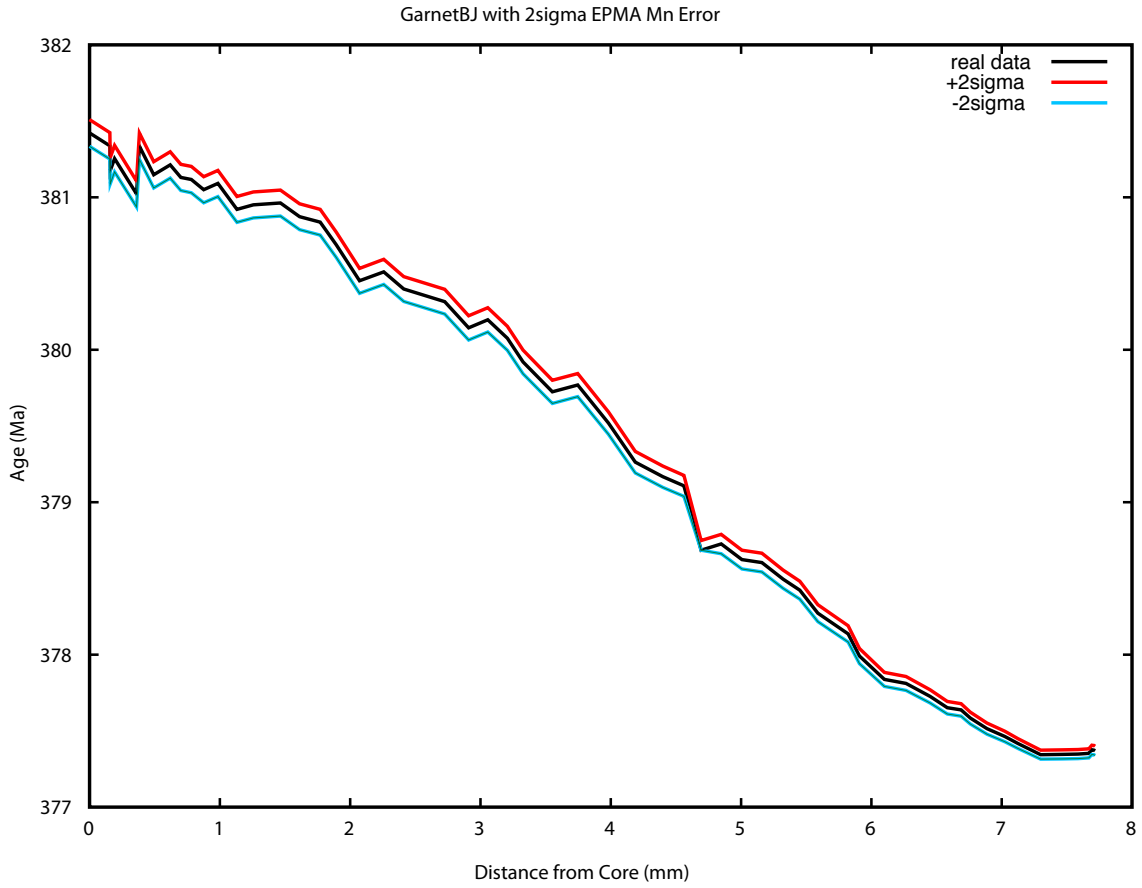


Figure 33. Garnet BJ calculated Mn-Ages (black) with EPMA ±2sigma error (red and blue).

than presumed.

Discussion

Sm-Nd Ages and Disequilibrium

A hypothesis as to why the $^{147}Sm/^{144}Nd$ age dataset is different than expected can be related to disequilibrium processes. Because many of the garnet ages are isotopically robust with good $^{147}Sm/^{144}Nd$ ratios, an explanation other than sampling errors or failure to remove inclusions is necessary. Six out of ten of the garnet rims are equivalent within error at 376 Ma (Fig. 28). The other four garnet rims have no overlap and are as young as ~350 Ma. Whatever caused these isotopic age discrepancies must have happened during or after primary garnet growth. Possible explanations excluding laboratory errors are secondary garnet growth, chemical inhomogeneity, resorption, and/or recrystallization.

Though various explanations may be possible, Mn upticks at the rims in conjunction with unreasonably young rim ages are suspect. In many garnets throughout the kinetics subvolume, and in some of the dated garnets, Mn upticks occur at the rims. Though secondary garnet growth is a possible explanation for this pattern, there is no textural evidence for it. One would also expect an initial increase in Mn followed by a decrease, obeying Rayleigh depletion; however, garnets with upticks at the rims do not show this at the scale of analysis (down to ~15 μm).

Another possible explanation for the different garnet ages and compositions could be whole-rock chemical and isotopic inhomogeneity. Because there is considerable variation of $^{147}Sm/^{144}Nd$ values from whole rock and matrix measurements throughout TD0914a, it is possible that each garnet equilibrated with a locally distinct isotopic volume. Because this thesis uses the 2-point isochron analysis method, where the age

is calculated from a line fitted to the measured Nd and Sm isotopic ratios of the garnet and its surrounding matrix, isotopic inconsistencies in the matrix can greatly affect the calculated age of the garnet sample. This effect could explain the scatter in the Sm-Nd dataset.

However, the likely cause of Mn upticks and young rim ages is garnet resorption. One piece of evidence for garnet resorption lies in chlorite bordering garnet porphyroblasts. Figure 21 shows chlorite mimicking the garnet face as well as the EPMA traverses with one of the corresponding age-distance graphs. It is common in the Pinney Hollow formation to have chlorite rims around garnet; however, because chlorite mimics the garnet shape so perfectly, one can infer that the chlorite has replaced the garnet. Figure 14 shows a chlorite halo coincident with a Mn uptick at the rim of garnet AC. In Inui and and Toriumi (2004), experiments show that in a prograde reaction garnet replaces chlorite in a dehydration. This article along with many others (e.g. Loomis and Nimick, 1982; Mohr, 1956) shows that Mn has a higher distribution coefficient in garnet than in chlorite. Because the reaction to form garnet from chlorite is a dehydration reaction, a hydrous fluid must enter the rock in order for a retrograde reaction of garnet into chlorite to occur. Given the concurrence of rim upticks and a chlorite halo in garnet AC, upticks could be expressing back diffusion of Mn into the garnet when garnet is replaced by chlorite. Back diffusion of Mn would cause the subvolume garnet rims to appear older than the actual age during primary growth. However, resorption and back diffusion cannot be used to explain the overly young rims in the Sm/Nd dataset unless REE isotopic re-equilibration and resetting of the isotopic clock were to occur, causing the rims to appear younger than the actual primary growth period would be.

Though dated garnets 3 and 10 were culled because of their reverse age zoning (older ages rimward of younger ages), an exploration into why this reverse age zoning occurred is warranted. Reverse age zoning could have been caused by inclusion

trails acting as conduits for fluid flow. Hypothetically, an external fluid could travel along the spiral inclusions, affecting the isotopic systematics as it travels. Assuming that this fluid affected the isotopic system, the major element systematics should also be affected. However, disruption of major element zoning within garnets 3 and 10 was not observed. Another possible explanation for reverse age zoning could be the formation of garnet clusters. The results could be skewed by garnet clusters if a younger zone of one garnet amalgamated with an older zone of the other garnet. If two garnets were clustered together, then the age sampling could have taken the younger zone inadvertently. The dates could also be a mix between these two garnet zones (younger and older), still causing a decrease in age. Furthermore, reverse age zoning could have been caused by heterogeneities in the isotopic composition that were never removed via diffusional equilibration with the rest of the matrix.

While this thesis used a two-point isochron analytical method, this representation of the system may be flawed. In order to use the two-point isochron analytical method, one must assume that the matrix, taken from the zone adjacent to the garnet, represents the chemistry with which the garnet rim was in equilibrium during primary growth. Also, one must assume that the whole rock composition represents the chemistry with which the garnet core was in equilibrium upon nucleation. For the purpose of this thesis, these assumptions were necessary to move forward. However, because of the complexity of the $^{147}Sm/^{144}Nd$ age dataset, the ages from this analytical method may be more of an approximation of the dates. To accurately represent the system, an alternative method of analysis may be necessary. Due to inordinately young ages, reverse age zoning, and isotopic heterogeneity within various matrix and whole rock samples, identification of the exact isotopic composition from which the garnets grew is impossible. Gatewood and Baxter (pers. comm.) have used a method wherein individual garnet segments are paired with multiple matrix and whole rock samples on

27-point isochrons. This method of analysis would more conservatively represent the uncertainty in the age estimates.

Garnet Chemical Zoning

In general, the garnets from the kinetics subvolume show regular Mn growth zoning, excepting the rims. However, a few garnets show irregular growth zoning; Garnet BT is one. What should be an initial highest X_{Mn} value in the core tapering off to a low X_{Mn} value at the rim is actually disarray in garnet BT wherein the chemical "core" of the garnet is actually in the upper right outer mantle region (Figure 26). Due to the small size of garnet BT, it is possible that the garnet zoning pattern was overprinted by an external fluid. This fluid could be the same hydrous fluid that caused the replacement of garnet with chlorite and subsequent Mn upticks. While this project hinges on the sample coming from a closed system, only garnet BT and larger garnet rims have been affected by an outside fluid. The majority of garnets in the subvolume show normal Mn growth zoning. This means that, excepting garnet BT and the very outer most rim of garnets with chlorite rims, the majority of the Mn measurements represent the Mn concentration of garnet during primary growth. Logically speaking, all of the garnets with chlorite rims and Mn upticks should be slightly younger than they appear, but the rest of garnet is still intact and unaffected by open system behavior.

The irregularity in garnet BM where one traverse is a smooth curvilinear decrease in Mn with distance from the core, while the second traverse has a spike in Mn in the middle of the mantle needs further explanation (Fig. 25). Possibly, the spike followed by smooth decrease in X_{Mn} represents the aggregation of one garnet onto another. Another possibility could be the formation of a polycrystal (Whitney et al., 2008). However, in order to distinguish which process occurred, further analysis on garnet BM using EBSD is necessary.

Mn-Age Relationship

One potential issue with the $^{147}Sm/^{144}Nd$ dataset lies in the overlap in the uncertainty between ages of some of the mantles, cores, and rims. Differentiating between these zones would be impossible, considering the uncertainties, but differentiation between zones is unnecessary for this particular project. What this project depends on is the ability to use the Mn value of any datum and get a Mn-age using the calculated equation. However, based on the Sm-Nd dataset, even the correlation between Mn value and time is complicated. In the dataset, there are similar Mn values with vastly different ages, implying that either Mn is not equally distributed throughout the sample, or some kind of open system behavior is at play here. This irregularity forced major culling of the age dataset.

Though an effort was made to clean up the Mn-age data, culling was done judiciously. Figure 34 gives one example of what data look like before and after culling. Noise in the Mn-age data could be related to EPMA error, but also to accidental analysis of inclusions, be they on, or just below the surface of the garnet. Many of the garnets have large inclusion trails, making it impossible to take measurements along a perfectly linear traverse. Because of the variation in inclusion trails, some of the traverses have large sections that could not be measured. This takes away from the "smooth" quality of the perfect growth-zoning pattern. Further X-ray mapping such as in figure 35 from Gatewood could elucidate the relationship between real zoning patterns and noise, irregular traverses, or chemical influence from inclusions.

Durations of Growth and Nucleation

While Christensen et al. (1989) calculated a 10.5 ± 4.2 Myr interval of growth for the Townshend Dam garnets, this project calculates a growth duration half that. However, 4.9 ± 2.7 Myr is within error of the previous work, and given the largely different methods, may be acceptable.

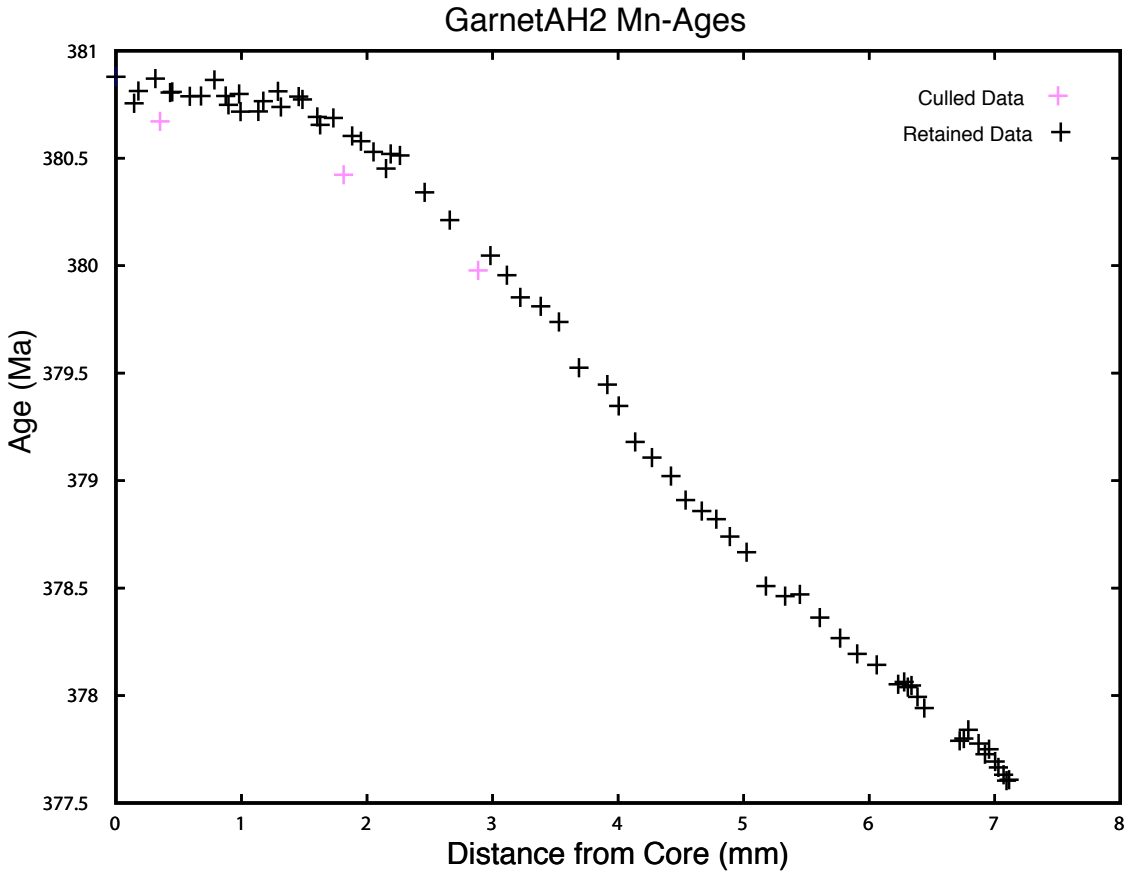


Figure 34. Garnet AH traverse 2 Mn-age versus distance graphs. Bright pink points were culled, while the rest were kept to calculate incremental growth rates.

Figure 35. Example garnet 14a from the Sm/Nd set. This garnet shows smooth clear Mn growth zoning with very little irregularity. Garnet was mapped for Mn abun- dance using EPMA.

Because the X_{Mn} values of the garnet rims vary much more than expected, the systematics of garnet growth duration in this sample may be more complicated than this project is capable of dealing with. Garnet X_{Mn} rim values differ by up to 2%. While all of the garnets should have theoretically finished growing at the same time, in reality, there is a 3.3 Myr discrepancy between garnet rim ages. This discrepancy could have been caused by garnet resorption wherein Mn diffuses back into and concentrates in the rim, making the Mn-age older.

The calculated growth duration is dependent on the highest and lowest X_{Mn} values in the sample. However, the small garnets that could not be extracted or analyzed likely contain low X_{Mn} values. Since it is possible that there was a small garnet with a lower X_{Mn} value than the lowest measured, the growth duration could be slightly longer than calculated. Additionally, the lost garnets could not be counted as nucleation events for the nucleation rate. It is impossible to quantify whether the extended growth duration or the larger number of nucleation events had a larger effect on the final nucleation rate. The nucleation rate would be lower if the growth duration was considerably longer, but the rate would be higher if the number of missed garnets was large.

Incremental Growth Rates

As mentioned above, several of the incremental growth rate curves have unrealistic (negative or inordinately large) values, irregular patterns, and mismatched growth rates between traverses of the same garnets. Negative values in growth rate stem from irregularity in the Mn values with distance. If the first of two neighboring points (the point closer to the core) has a slightly lower Mn value than the adjacent rim-ward point, the calculated growth rate between those points will be negative. There may be multiple reasons for this discrepancy: a) there is noise in the data that is intrinsic to EPMA analysis, and because the distances between adjacent points are small, small Mn fluctuations produce large effects, b) the point with the lower Mn value may have been

an inclusion or there is an inclusion just beneath the surface at that point, influencing the measurement, or c) influx of a Mn-rich fluid could explain negative growth rates at the rims of garnets or even as far as the core if the fluid infiltrated through cracks or followed inclusion trails like conduits.. Because negative growth rates are impossible, they have been excluded from the overall growth curve pattern analysis. Overly large values may occur for the same reasons negative growth rates occur, except with the large values, the first Mn value was overly large compared to the second. The polynomial fitting was an attempt to smooth the dataset to ameliorate this problem; the sixth-order polynomial was employed to achieve a balance between smoothing to remove unreasonable growth rates and faithfulness to actual core-rim variation in growth rates.

Excluding the irregularities in the incremental growth rates, some common patterns occur in the samples. These are an increase in growth rate at the core with a taper toward the rim, an increase in growth rate in the middle third and a taper toward the rim, a spike in growth rate at the rim, and finally, a mix of all of the above. Figure 32 shows exemplary garnet incremental growth curves. Variation in garnet growth rate over time could be caused by changes in metamorphic conditions like increases in temperature, new phases dissolving and diffusing, influx of a Mn-rich fluid, or competition among neighboring garnets for nutrients.

Spatial Variation and Kinetics

While a much more thorough statistical analysis of the spatial distribution of garnet porphyroblasts should be conducted before determining the rate limiting factor, preliminary results support diffusion-control. Two qualitative assumptions in this project must be addressed to establish the rate-limiting factor of the system: first, if the system is interface-limited, the garnet with the oldest core must necessarily have the largest radius and competition for nutrients between garnets would not occur; second, the growth rate of an interface-limited garnet would not change with distance over time (Carlson, 2010).

The animation (App. 8) as well as the calculated Mn-ages and radii show that the first garnet to nucleate (garnet AV) was the largest with a 11.2mm radius; however, the garnet with the second largest radius (garnet AI at 11.1 mm) nucleated 1.32 Myr after garnet AV. Nearly 50 garnets nucleated between the time of garnet AV nucleation and garnet AI nucleation. Garnet AI nucleated in an area with relatively few porphyroblasts while many nucleation events occurred near AV. AI had less competition for nutrients, allowing it to grow nearly as large as AV in a fraction of the time. The incremental growth rates of garnet AV traverse 1 and garnet AI traverse 1 exemplify this difference in growth rate. Garnet AV begins with a relatively high growth rate, spiking at ~5 mm/Myr followed by a decrease. In the same pattern, garnet AI spikes at a growth rate of ~7mm/Myr, a considerably larger rate. Garnets with widely differing nucleation ages growing to similar sizes imply that competition among garnets can cause stunted growth. If garnets are competing for nutrients, this implies a diffusion-limited system.

To address the second assumption (that a system with interface control would have no change in incremental growth rate) one need only observe the previously mentioned growth curves of garnets AV and AI. Each of these garnets have changes in growth rate over distance. This means that changes in temperature and competition for nutrients could affect the rate of garnet growth, thereby disproving interface control and implicating a diffusion control.

Also important to note from the HRXCT data and the animation is the spatial distribution of garnet nucleation events. It appears there are areas of higher reaction affinity where many nucleation events occur (bottom right hand corner of the video, coordinates 400, 100). However, in some areas (e.g. where garnet AI nucleated) the reaction affinity is small, and very few nucleation events occur over time. The size of garnet AI, and the speed at which it grew indicate that areas of low reaction affinity do not inhibit growth rate, but only nucleation. This may be why many garnets are so large

in this location.

When considering the spatial distribution of porphyroblasts and competition among neighbors, the importance of the tiny lost garnets comes in to play. While there is no way to estimate the number of nucleation events these small garnets represent, it is clear that they could be a source of competition for the larger garnets at the end of the growth period. The sizes and growth rates of larger garnets in areas of high reaction affinity were likely stunted when these tiny garnets nucleated near by. One way to better approximate the number of tiny garnets would be to take another slice of TD0914a (next to the kinetics subvolume) and collect HRXCT geared toward smaller garnets, rather than the large ones. This way we could get a better idea of the spatial distribution, density, and volume of the miniscule garnets. The number of tiny garnets in the newly analyzed slice could act as a proxy for the number of small garnets in the kinetics subvolume.

Conclusions

This thesis expands on Wright's (2010) work to establish the first measured nucleation and growth rates of a natural system. By using the pronounced fractionation of Mn into garnet as a proxy for time since nucleation, this project developed a method to date thousands of points. These data provide much insight into the complicated system of metamorphic garnet nucleation and growth kinetics. Not surprisingly, a natural system is more complicated than a kinetics model. The discovery of a complicated system with unexpected results is in itself noteworthy. This first full dataset of natural growth and nucleation rates offers others an opportunity to test kinetics models and explore the relationship between garnet REE fractionation and time.

A qualitative analysis of the spatial distribution of garnets supports the hypothesis that garnet growth rates are controlled by the rate of diffusion of elements from the dissolving phases, through the matrix, and to the surface of the growing garnet. When garnets compete with one another for nutrients, their growth is stunted if nucleation

events occur in close proximity close. However, the competition among neighbors for nutrients seems to vary throughout the sample. Some garnets (observe the middle bottom of the animation) grow large, regardless of the proximity of many neighbors. However, the rate at which these garnets grew is the major observation (garnet AI versus garnet AV). In light of these qualitative conclusions, a more rigorous statistical analysis of the spatial distribution of garnets is necessary in order to truly prove a diffusion-limited system. Furthermore, the results from this study as well as the HRXCT data may be used to test the accuracy of forward models that previous studies have used to establish nucleation rates and rate-limiting factors.

This study establishes a correlation between Mn and age, but systematics of the isotopic age complicate the issue and decrease the resolution for the system. Though previous studies did not find any retrogression in this area, chlorite selvages and upticks in Mn at the rims of garnets imply that retrogression or recrystallization did occur. Rim upticks in Mn content complicate the process of putting a number on the end of primary garnet growth; therefore forcing the removal of numerous isotopic age dates that might not have represented the primary growth system. Removing thirteen $^{147}Sm/^{144}Nd$ age dates left a less robust dataset with lower confidence. Due to the complexity of the $^{147}Sm/^{144}Nd$ isotopes in this system, another study could be conducted on systematics of trace elements in garnets. More research into the systematics of trace elements in the Townshend Dam garnets could give insight in to the complexity of the $^{147}Sm/^{144}Nd$ system and better constrain what happened in order to cause reverse age zoning and overly young rim ages.

Despite these limitations, this study provides the first kinetic data set for metamorphic crystallization. It may be useful in testing current and future computational models for nucleation and growth of metamorphic porphyroblasts.

References

Baxter, E.F., Ague, J.J., and DePaolo, D.J., 2002, Prograde temperature-time evolution in the Barrovian type-locality constrained by Sm/Nd garnet ages from Glen Clova, Scotland: Journal of the Geological Society of London, v. 159, p. 71–82.

Baxter, E.F., and Caddick, M.J., 2013, Garnet growth as a proxy for progressive subduction zone dehydration: Geology, v. 41, no. 6, p. 643–646.

Carlson, W.D., 2010, Porphyroblast crystallization: Linking processes, kinetics, and microstructures: International Geology Review, v. 53, no. 3 & 4, p. 406–445.

Chamberlain, C.P., and Conrad, M.E., 1993, Oxygen-isotope zoning in garnet: A record of volatile transport: Geochimica et Cosmochimica Acta, v. 57, no. 11, p. 2613–2629.

Christensen, J.N., Rosenfeld, J.L., and DePaolo, D.J., 1989, Rates of tectonometamorphic processes from rubidium and strontium isotopes in garnet: Science, v. 244, p. 1465–1469.

Connolly, J.A.D., 2005, Computation of phase equilibria by linear programming: A tool for geodynamic modeling and its application to subduction zone decarbonation: Earth and Planetary Science Letters, v. 236, no. 1–2, p. 524–541.

Doll, C.G., Cady, W.M., Thompson, J.B., and Billings, M.P., 1961, Centennial Geologic Map of Vermont: Vermont Geological Survey, Vermont Development Dept.,; Williams & Heintz Map Corp.

Dragovic, B., 2013, Constraining the rates and timescales of garnet growth and associated dehydration during metamorphism [Dissertation]: Boston University.

Gatewood, M., 2013, Using Garnet Major Element and Isotopic Zoning as a Tool to Evaluate the Scales of Equilibrium in Metamorphic Rocks and the Rates of Tectonic Processes [Dissertation]: The University of Alabama.

Harvey, J., and Baxter, E.F., 2009, An improved method for TIMS high precision Nd isotopic analysis of very small aliquots (1-10ng) with example application in garnet Sm/Nd geochronology: Chemical Geology, , no. 258, p. 251–257.

Hirsch, D.M., Ketcham, R.A., and Carlson, W.D., 2000, An evaluation of spatial correlation functions in textural analysis of metamorphic rocks: Geological Materials Research, v. 2, no. 3, p. 1–41.

Hollister, L.S., 1966, Garnet zoning: an interpretation based on the Rayleigh fractionation model: Science, v. 154, p. 1647–1651.

Inui, M., and Toriumi, M., 2004, A Theoretical Study on the Formation of Growth

Zoning in Garnet Consuming Chlorite: Journal of Petrology, v. 45, no. 7, p. 1369–1392.

Karabinos, P., 1984, Polymetamorphic garnet zoning from southeastern Vermont: American Journal of Science, v. 284, p. 1008–1025.

Karabinos, P., and Laird, J., 1988, Structure and metamorphism from Jamaica to the Chester Dome, Vermont, *in* Guidebook for Fieldtrips, Durham, University of New Hampshire, p. 281–292.

Ketcham, R.A., Meth, C., Hirsch, D., and Carlson, W.D., 2005, Improved methods for quantitative analysis of three-dimensional porphyroblastic features: Geosphere, v. 1, no. 1, p. 42–59.

Kohn, and Spear, 1990, Two new geobarometers for garnet amphibolites, with applications to southeastern Vermont: American Mineralogist, v. 75, p. 89–96.

Kohn, M.J., and Valley, J.W., 1998, Effects of cation substitutions in garnet and pyroxene on equilibrium oxygen isotope fractionations: Journal of Metamorphic Geology, v. 16, p. 625–639.

Kohn, M.J., and Valley, J.W., 1994, Oxygen isotope constraints on metamorphic fluid flow, Townshend Dam, Vermont, USA: Geochimica et Cosmochimica Acta, v. 58, no. 24, p. 5551–5566.

Krystek, M., and Anton, M., 2008, A weighted total least-squares algorithm for fitting a straight line: Measurement Science and Technology, v. 19, no. 7, p. 079801.

Loomis, T.P., and Nimick, F.B., 1982, Equilibrium in Mn-Fe-Mg aluminous pelitic compositions and the equilibrium growth of garnet: The Canadian Mineralogist, v. 20, no. 3, p. 393–410.

Ludwig, K.R., 2008, User's manual for Isoplot 3.7. A geochronological toolkit for Microsoft Excel.: Berkeley Geochronology Center Special Publication, v. 4.

Mohr, P.A., 1956, Trace-Element Distribution in a Garnet-Chlorite Rock from Foel Ddu, near Harlech, Merionethshire: Mineralogical Magazine, v. 31, no. 235, p. 319–327.

Pollington, A.D., and Baxter, E.F., 2011, High precision microsampling and preparation of zoned garnet porphyroblasts for Sm-Nd geochronology: Chemical Geology, v. 281, no. 3-4, p. 270–282.

Ratcliffe, N.M., Armstrong, T.R., and Tracy, R.J., 1992, Tectonic-cover basement relations and metamorphic conditions of formation of the Sadawaga, Rayponda and Athens Domes, southern Vermont: Guidebook for field trips in the Connecticut Valley

region of Massachusetts and adjacent states: New England Intercollegiate Geological Conference, v. 2, p. 257–290.

Rosenfeld, J.L., 1970, Rotated garnets in metamorphic rocks: Geological Society of America Special Paper, v. 129, p. 105.

Spear, F.S., and Selverstone, J., 1983, Quantitative PT paths from zoned minerals: Theory and tectonic applications: Contributions to Mineralogy and Petrology, v. 83, no. 3, p. 348–357.

Whitney, D.L., Goergen, E.T., Ketcham, R.A., and Kunze, K., 2008, Formation of garnet polycrystals during metamorphic crystallization: Journal of Metamorphic Geology, v. 26, no. 3, p. 365–383.

Wright, J.B., 2010, Development of a new method for measuring metamorphic kinetics [Master's]: Western Washington University, Geology.

Yardley, B.W.D., 1977, An empirical study of diffusion in garnet: American Mineralogist, v. 62, p. 793–800.

York, D., 1969, Least-squares fitting of a straight line: Earth and Planetary Science Letters, v. 5, p. 320–324.

Tables

Sample ID	mg rock	Nd ppm	ng Nd loaded	^{147}Sm / ^{144}Nd	error (0.02%) (x1E3)	^{143}Nd / ^{144}Nd	2σ SE (x1e6)	2σ (ppm)	Age (Ma)	Age uncert. (Ma)
14b gt3 matrix	2.060	30.400		0.120	0.120	0.512	0.50	9.8		
14b gt3 zone 1	30.880	0.099	2.4	1.537	1.537	0.515	1.44	27.9	382.29	1.81
14b gt3 zone 2	72.500	0.113	6.3	1.832	1.832	0.516	1.01	19.6	380.90	1.21
14b gt3 zone 3	51.530	0.124	4.9	3.028	3.028	0.519	0.88	16.9	376.79	0.73
14a2 gt7 matrix	2.200	33.812		0.119	0.119	0.512	0.49	9.5		
14a2 gt7 zone 1	10.300	0.056	0.4	1.619	1.619	0.516	3.55	68.9	382.66	3.73
14a2 gt7 zone 2	30.100	0.073	1.7	2.342	2.342	0.517	2.15	41.5	378.98	1.62
14a2 gt7 zone 3	90.270	0.144	10.0	2.872	2.872	0.519	0.73	14.0	376.50	0.72
14a gt3 matrix	2.150	36.130		0.112	0.022	0.512	0.63	12.3		
14a gt3 zone 1	81.040	0.042	2.6	0.584	0.117	0.513	4.97	96.9	384.75	16.22
14a gt3 zone 2	201.100	0.101	15.6	0.686	0.137	0.513	2.04	39.7	338.46	5.67
14a gt3 zone 3	183.770	0.083	11.8	1.573	0.315	0.515	1.30	25.1	362.81	1.51
14a gt4 matrix	2.040	44.500		0.116	0.023	0.512	0.76	14.8		
14a gt4 zone 1	89.090	0.026	1.9	0.918	0.184	0.514	5.07	98.7	374.73	9.78
14a gt4 zone 2	187.600	0.151	23.9	1.372	0.274	0.515	1.12	21.8	369.01	1.66
14a gt4 zone 3	260.790	0.158	34.7	2.467	0.493	0.517	0.78	15.2	354.60	0.72
14a gt16 matrix	2.030	16.797		0.119	0.027	0.512	0.50	9.7		
14a gt16 zone 1	47.260	0.086	3.1	1.113	0.256	0.514	0.81	15.7	381.56	1.72
14a gt16 zone 2	268.130	0.105	21.6	1.321	0.304	0.515	0.85	16.4	373.28	1.46
14a gt16 zone 3	208.580	0.145	23.2	2.966	0.682	0.519	0.80	15.4	369.83	0.60
14a gt8 matrix	3.020	21.136	53.6	0.118	0.027	0.512	0.70	13.7		
14a gt8 zone 1	35.740	0.108	3.2	1.332	0.306	0.515	2.49	48.3	383.29	3.28
14a gt8 zone 2	37.380	0.122	3.8	1.087	0.250	0.514	2.50	48.7	376.88	4.14
14a gt8 zone 3	32.260	0.115	3.1	1.430	0.329	0.515	3.84	74.4	375.92	4.56
14a gt8 zone 4	23.350	0.151	2.7	1.645	0.378	0.516	3.29	63.7	374.56	3.38
14a gt8 zone 5	47.630	0.143	5.3	2.712	0.624	0.518	1.90	36.7	377.87	1.21
14a gt8 zone 6	55.700	0.137	5.9	3.179	0.731	0.519	2.23	43.0	375.69	1.18
14a gt10 matrix	3.170	19.358	51.5	0.113	0.026	0.512	0.51	9.9		
14a gt10 zone 1	169.190	0.097	13.8	1.303	0.300	0.514	0.65	12.7	323.61	1.40
14a gt10 zone 2	110.370	0.113	10.5	1.354	0.311	0.515	0.72	14.1	364.09	1.34
14a gt10 zone 3	70.480	0.138	8.2	1.948	0.448	0.516	0.67	13.0	377.24	0.91
14a gt10 zone 4	108.400	0.149	13.5	3.041	0.699	0.519	0.68	13.2	349.58	0.57
14a gt13 matrix	3.140	37.025	97.7	0.119	0.027	0.512	0.50	9.7		
14a gt13 zone 1	88.040	0.120	8.9	1.130	0.260	0.514	0.75	14.5	377.74	1.65
14a gt13 zone 2	81.270	0.148	10.1	1.191	0.274	0.515	0.82	16.0	380.02	1.61
14a gt13 zone 3	60.200	0.178	9.0	1.721	0.396	0.516	0.70	13.5	379.48	1.04
14a gt13 zone 4	57.360	0.159	7.7	2.272	0.523	0.517	0.92	17.8	377.43	0.86
14a gt9 matrix	1.660	49.406	61.5	0.113	0.026	0.512	0.45	8.8		
14a gt9 zone 1	170.050	0.214	27.2	0.596	0.137	0.513	0.75	14.6	368.18	3.45
14a gt9 zone 2	134.750	0.162	16.4	0.983	0.226	0.514	0.65	12.6	381.81	1.92
14a gt9 zone 3	39.400	0.157	4.6	2.324	0.535	0.517	0.86	16.7	379.89	0.80
14a gt4b matrix	1.180	35.901	35.6	0.117	0.027	0.512	0.61	11.9		
14a gt4b zone 1	39.420	0.182	5.4	0.763	0.176	0.514	1.18	23.0	381.71	3.34
14a gt4b zone 2	36.730	0.214	5.9	0.632	0.145	0.513	1.86	36.3	379.76	5.98
14a gt4b zone 3	6.880	0.275	1.4	0.747	0.172	0.514	1.72	33.5	387.45	4.58
14a gt4b zone 4	58.510	0.196	8.6	1.183	0.272	0.515	1.18	23.0	377.18	2.03
14a gt4b zone 5	33.100	0.337	8.4	1.114	0.256	0.514	0.88	17.2	377.70	1.80
14a gt4b zone 6	64.250	0.222	10.7	2.048	0.471	0.517	1.22	23.7	374.96	1.15
14a 3-4mm matrix	1.604	34.602	38.9	0.121	0.028	0.512	0.80	15.6		
14a 3-4mm garnets	17.600	0.180	2.2	1.861	0.428	0.516	1.72	33.4	377.89	1.67
14a 1mm matrix	1.595	31.358	35.0	0.115	0.026	0.512	0.95	18.5		
14a 1mm garnets	30.040	0.143	3.0	2.762	0.635	0.518	1.87	36.1	374.91	1.22

Table 1. Sm/Nd dataset from Ethan Baxter and Besim Dragovic.

Run #	SiO_2	TiO_2	Al_2O_3	Fe_2O_3	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	Total
6	61.921	0.917	18.369	7.324	0.029	2.667	0.422	1.860	3.971	0.141	97.621
7	61.893	0.919	18.406	7.391	0.029	2.669	0.420	1.827	3.997	0.143	97.694
8	61.846	0.921	18.354	7.366	0.032	2.672	0.423	1.753	3.977	0.139	97.483
9	61.591	0.922	18.351	7.350	0.030	2.660	0.419	1.740	3.996	0.145	97.204
10	61.500	0.924	18.361	7.376	0.031	2.685	0.423	1.885	3.989	0.143	97.317
Avg	**61.750**	**0.921**	**18.368**	**7.361**	**0.030**	**2.671**	**0.421**	**1.813**	**3.986**	**0.142**	**97.464**
1σ	0.191	0.003	0.022	0.026	0.001	0.009	0.002	0.064	0.012	0.002	
2σ	0.379	0.005	0.044	0.051	0.003	0.018	0.004	0.127	0.023	0.005	
norm	**63.357**	**0.945**	**18.846**	**7.553**	**0.031**	**2.740**	**0.432**	**1.860**	**4.090**	**0.146**	**100**

Table 2. Whole-rock XRF data from the red-purple section in TD0914a. Mean composition was used as imput to create pseudosection in Perple_X. From Gatewood (pers. comm).

Mn	Mn error	Age	Uncertainty
0.21	0.004	382.29	1.69
0.12	0.003	380.90	1.09
0.01	0.004	376.79	0.66
0.19	0.004	382.75	3.69
0.11	0.003	379.04	1.58
0.02	0.004	376.55	0.64
0.21	0.004	381.71	3.15
0.04	0.002	377.70	1.65
0.01	0.009	374.96	1.09
0.23	0.004	383.30	3.30
0.18	0.004	376.90	4.10
0.14	0.003	375.90	4.50
0.09	0.003	381.81	1.39
0.01	0.005	379.89	0.68
0.13	0.003	380.02	1.38
0.05	0.002	379.48	0.82
0.01	0.005	377.43	0.75
0.20	0.004	381.56	1.46
0.12	0.003	373.28	1.25

Table 3. Reduced age data set used for fitting Mn-age relationship.

Temperature in K	Pressure in Bar	Mol % garnet
773	7000	0.52
783	7100	4.5
793	7200	5.85
803	7300	7.45
813	7400	10.75
823	7500	13.58
833	7600	14.97
843	7700	14.9
853	7800	15.33
863	7900	17.09
873	8000	18.58
873	9000	19.45
873	10000	19.31

Table 4. Inputs of temperature and pressure for Perple_X pseudosection along with mode garnet as output.

Fit Output	
m	5.20E-02
b	-6.33E-02
α	5.20E-02
p	-6.32E-02
Xopt	5.72E+01
Variance (m)	1.37E-04
Variance (b)	1.77E-04
Variance (m, b)	9.33E-06
Variance (α)	1.37E-04
Variance (p)	1.77E-04
Variance (α, p)	9.74E-06
xmid	3.78E+02
ymid	1.18E-01

Table 5. Outputs from WTLS documenting the nature of the linear fit to the Mn vs. age data set.

Appendices

Appendix 1. Octave Programs

Processdata.m

```
#load age and mn data with uncertainties
clear -all
format long
data=load ("RBAgedataset.txt");
xin=data(:,1); %Age
yin=data(:,3); %Mn
uxin=data(:,2); %Age Uncertainty
uyin=data(:,4); %Mn Uncertainty
guck=0;

#fit line data
fitvector=wtls_line_offset (xin, yin, uxin, uyin, guck);


#list all files in folder
parentDirectory = "/Users/rose/octavedir/";
datadirectory=strcat(parentDirectory,"Octavefiles/");
plotdirectory=strcat(parentDirectory,"octavePlots/");
smootheddatadirectory=strcat(parentDirectory,"smootheddata/
");
BigFilePath=strcat(parentDirectory,"OutputForWord.txt");
CoreFilePath=strcat(parentDirectory,"CoreList.txt");
RimFilePath=strcat(parentDirectory,"RimList.txt");
IDLFilePath=strcat(parentDirectory,"OutputForIDL.txt");
IDL_FID = fopen(IDLFilePath, 'w');

[files, error, message]=readdir (datadirectory);
output large file for word (odd character at beginning, name
of garnet
BigOutput="";

#how many units in file vector
numfiles=rows(files);
numGoodFiles=0;
lastGarnetCode = "";
#loop
for CurFileNum=3:numfiles
     clear CurGarnetMn CurGarnetAge CurGarnetAgeUncert
CurGarnetDistance p N f_prime x_prime y_prime x y CurFitPlot
CurPlot fitAges UnalteredData PreSmoothedData
```

```
     clear NewCurGarnetAgeUncert NewCurGarnetDistance
NewCurGarnetMn NewCurGarnetAge newFitAges
     CurFile=files(CurFileNum,1);
     CurFile = CurFile{1,1};
     if (CurFile(1) != '.')
          CurFileRootName = CurFile(1:length(CurFile)-4);
          CurPath=strcat(datadirectory,CurFile);
          garnetcode = CurFileRootName(7:
length(CurFileRootName)-6);
          traversecode=strfind(CurFileRootName, 'curve');
          traversecode=CurFileRootName(traversecode + 5);
          CurGarnetName=strcat("Garnet", garnetcode,
traversecode)
          CurFitPlotPath=strcat(plotdirectory,
CurFileRootName, "_fitted.pdf");
          CurSmoothedPlotPath=strcat(plotdirectory,
CurFileRootName, "_smoothed.pdf");
          CurGrowthPlotPath=strcat(plotdirectory,
CurFileRootName, "_growth.pdf");
          CurOriginalPlotPath=strcat(plotdirectory,
CurFileRootName, "_unaltered.pdf");
          CurPlotPath=strcat(plotdirectory, CurFileRootName,
"_unalteredfit.pdf");
          CurPureDataPath=strcat(smootheddatadirectory,
CurFileRootName, "_unchanged.txt");
          CurDataPath=strcat(smootheddatadirectory,
CurFileRootName, "_smoothed.txt");
          CurPolyPath=strcat(smootheddatadirectory,
CurFileRootName, "_kinetics.txt");
          CurGarnet=load (CurPath);
          CurGarnetMn=CurGarnet(:,48);
          CurOverShot=CurGarnet(:,51);
          CurFitOutput = multipleFitsToLine(CurGarnetMn,
fitvector);
          CurGarnetDistance=CurGarnet(:,6);
          CurGarnetAl=CurGarnet(:,9);
          CurGarnetSi=CurGarnet(:,10);
          CurGarnetAge=CurFitOutput (:, 1);
          CurGarnetAgeUncert=CurFitOutput (:,2);
          datasmoothing
          nucleation
          polynomial
          BigOutput=strcat(BigOutput, sprintf("^%s&\n",
CurFileRootName));
```

```
          BigOutput=strcat(BigOutput, output);
          IDLOutput
          numGoodFiles=numGoodFiles+1;
     endif
endfor

garnetcode = "end"; #trigger to make IDL output work for the
last garnet
IDLOutput #need to run this to output the data from the last
one

save(BigFilePath, "BigOutput")
sortrows(core, 2);
sortrows(rim, 2);
coreOutput = "Garnet Name\tCore Mn\tCore Age\tCore Age Unc.\
tDistance\n";
for j=1:rows(core)
     thisNameIndex = core(j, 5);
     thisName = names{thisNameIndex};
     thisLine = sprintf("%s\t%f\t%f\t%f\t%f\t\n", thisName,
core(j,1), core(j,2), core(j,3), core(j,4));
     coreOutput = strcat(coreOutput, thisLine);
endfor
save(CoreFilePath, "coreOutput");

rimOutput = "Garnet Name\tRim Mn\tRim Age\trim Age Unc.\
tDistance\n";
for j=1:rows(rim)
     thisNameIndex = rim(j, 5);
     thisName = names{thisNameIndex};
     thisLine = sprintf("%s\t%f\t%f\t%f\t%f\t\n", thisName,
rim(j,1), rim(j,2), rim(j,3), rim(j,4));
     rimOutput = strcat(rimOutput, thisLine);
endfor
save(RimFilePath, "rimOutput");

fclose(IDL_FID)
```

Datasmoothing.m

```
%N=number of data points
N=rows(CurGarnetDistance);
dataoutput="Mn\tAge\tAge Unc.\tDistance\n";
for i=1:N
    dataoutput=strcat(dataoutput, sprintf("%f\t%f\t%f\t%f\
```

```
n", CurGarnetMn(i), CurGarnetAge(i), CurGarnetAgeUncert(i),
CurGarnetDistance(i)));
endfor
dataoutput;
save (CurPureDataPath, "dataoutput");

#plot and save
UnalteredData=plot(CurGarnetDistance, CurGarnetAge, "+",
"markersize", 9);
legend ('Original Data');
CurPlotTitle=strcat(CurGarnetName, ' Original Data');
title (CurPlotTitle, 'fontsize', 16, 'fontname',
'Helvetica');
xlabel ("Distance from Core (mm)", 'fontsize',
15,'fontname', 'Helvetica');
ylabel ("Age", 'fontsize', 15, 'fontname', 'Helvetica');
saveas (UnalteredData, CurOriginalPlotPath, "pdf");

#remove overshot points
i=1;
while i <= N   # Must use a while loop here, because Octave
won't let you change i inside a for loop
     if CurOverShot(i) == 2
          notice = sprintf("Removing point %d from data set
based on Overshot; Age = %f;  Mn=%f\n", i, CurGarnetAge(i),
CurGarnetMn(i));
          CurGarnetAge(i) = [];
          CurGarnetMn(i) = [];
          CurGarnetDistance(i) = [];
          CurGarnetAgeUncert(i) = [];
          CurOverShot(i) = [];
          CurGarnetSi(i) = [];
          CurGarnetAl(i) = [];
          i=i-1;
          N = N - 1;
     endif
     i = i+1;
endwhile

#remove points that may be inclusions based on Si content
i=1;
while i <= N
     if CurGarnetSi(i) > 39 || CurGarnetSi(i) < 34
          notice = sprintf("Removing point %d from data
```

```
set based on CurGarnetSi (%f); Age = %f;  Mn=%f\n", i,
CurGarnetSi(i), CurGarnetAge(i), CurGarnetMn(i));
          CurGarnetAge(i) = [];
          CurGarnetMn(i) = [];
          CurGarnetDistance(i) = [];
          CurGarnetAgeUncert(i) = [];
          CurOverShot(i) = [];
          CurGarnetSi(i) = [];
          CurGarnetAl(i) = [];
          i=i-1;
          N = N - 1;
     endif
     i = i+1;
endwhile

#remove points that may be inclusions based on Al content
i=1;
while i <= N
     if CurGarnetAl(i) > 23 || CurGarnetAl(i) < 20
          notice = sprintf("Removing point %d from data
set based on CurGarnetAl (%f); Age = %f;  Mn=%f\n", i,
CurGarnetAl(i), CurGarnetAge(i), CurGarnetMn(i));
          CurGarnetAge(i) = [];
          CurGarnetMn(i) = [];
          CurGarnetDistance(i) = [];
          CurGarnetAgeUncert(i) = [];
          CurOverShot(i) = [];
          CurGarnetSi(i) = [];
          CurGarnetAl(i) = [];
          i=i-1;
          N = N - 1;
     endif
     i = i+1;
endwhile

## Fit a 6th order polynomial
order = 6;

## Find the statistics of the goodness of the fit
[p,s] = polyfit (CurGarnetDistance, CurGarnetAge, order);


## Evaluate the fitted polynomial
fitAges = polyval (p, CurGarnetDistance);
```

```
#plot and save
PreSmoothedData=plot(CurGarnetDistance, fitAges,
CurGarnetDistance, CurGarnetAge, "+", 'markersize', 9);
legend ('Fitted polynomial', 'Original Data');
CurPlotTitle=strcat(CurGarnetName, ' 6th Order Polynomial
fitted to Original Data');
title (CurPlotTitle,'fontsize', 16, 'fontname',
'Helvetica');
xlabel ("Distance from Core (mm)", 'fontsize', 15,
'fontname', 'Helvetica');
ylabel ("Age", 'fontsize', 15, 'fontname', 'Helvetica');
saveas (PreSmoothedData, CurPlotPath, "pdf");

#remove points with high variance
localVariance = zeros(N-4);
for i = 3:N-2
     localVariance(i-2) = var(CurGarnetAge(i-2:i+2));
endfor
varianceMatrix = mean(localVariance);
variance = varianceMatrix(1);
i=1;
while i <= N
     thisFitAge = fitAges(i);
     % if the the y-value of i>distance sigma, remove point
i
     offset = abs(CurGarnetAge(i)-thisFitAge);
     CurGarnetDistance(i);
    if offset > (variance * 10)
     notice = sprintf("Removing point %d from data set based
on variance (%f); Age = %f; SmoothedAge = %f.  Mn=%f\n", i,
variance, CurGarnetAge(i), thisFitAge, CurGarnetMn(i));
         CurGarnetAge(i) = [];
         CurGarnetMn(i) = [];
         CurGarnetDistance(i) = [];
         CurGarnetAgeUncert(i) = [];
         fitAges(i) = [];
         CurOverShot(i) = [];
          CurGarnetSi(i) = [];
          CurGarnetAl(i) = [];
         i=i-1;
         N = N - 1;
    endif
%N = number of data points (might have changed with
```

```
discarding a point)
%   N=columns(CurGarnetDistance)
     i = i + 1;
endwhile

#save to large output file
output="";
for i=1:N
    output=strcat(output, sprintf("%f\t%f\t%f\t%f\n",
CurGarnetMn(i), CurGarnetAge(i), CurGarnetAgeUncert(i), Cur
GarnetDistance(i)));
endfor
output;
save (CurDataPath, "output");

#Plot data
smoothed=plot(CurGarnetDistance, CurGarnetAge, '+',
"markersize", 9);
legend ('Culled Data');
CurPlotTitle=strcat(CurGarnetName, ' Culled Ages');
title (CurPlotTitle, 'fontsize', 16, 'fontname',
'Helvetica');
xlabel ("Distance from Core (mm)", 'fontsize', 15,
'fontname', 'Helvetica');
ylabel ("Age (Myr)", 'fontsize', 15, 'fontname',
'Helvetica');
saveas (smoothed, CurSmoothedPlotPath, "pdf");
```

nucleation.m

```
#Write a function that orders all of the core dates from
oldest to youngest
core(numGoodFiles+1,:)=[CurGarnetMn(1), CurGarnetAge(1),
CurGarnetAgeUncert(1), CurGarnetDistance(1),
numGoodFiles+1];
rim(numGoodFiles+1,:)=[CurGarnetMn(end), CurGarnetAge(end),
CurGarnetAgeUncert(end), CurGarnetDistance(end),
numGoodFiles+1];
names{numGoodFiles+1}=CurGarnetName;
```

Polynomial.m

```
## Fit a 6th order polynomial
order = 6;

##Find the statistics of the goodness of fit
```

```
[p,s] = polyfit (CurGarnetDistance, CurGarnetAge, order);

## Evaluate the fitted polynomial
x = CurGarnetDistance;
y = polyval (p, x);

## Plot
CurFitPlot=plot(x, y, CurGarnetDistance, CurGarnetAge, '+',
'markersize', 9);
legend ('Fitted polynomial', 'Culled Data');
CurPlotTitle=strcat(CurGarnetName, ' Polynomial Fitted to
Smoothed Data');
title (CurPlotTitle, 'fontsize', 16, 'fontname',
'Helvetica');
xlabel ("Distance from Core", 'fontsize', 15, 'fontname',
'Helvetica');
ylabel ("Age", 'fontsize', 15, 'fontname', 'Helvetica');
save plot
saveas (CurFitPlot, CurFitPlotPath, "pdf");

#change in distance over change in time is equal to growth
rate
f_prime = diff(x) ./ -diff(y);
x_prime=diff(x);
y_prime=diff(y);
growthrateoutput=f_prime;
save data
save (CurPolyPath, "growthrateoutput");

#saveplot
CurPlot = plot(x(1:length(x)-1), f_prime, 'k');
legend ('Growth Rate');
CurPlotTitle=strcat(CurGarnetName, ' Growth Rate over
Distance');
title (CurPlotTitle, 'fontsize', 16, 'fontname',
'Helvetica');
ylim([0 10])
xlabel ("Distance from Core (mm)", 'fontsize', 15,
'fontname', 'Helvetica');
ylabel ("Growth Rate (mm/Myr)", 'fontsize', 15, 'fontname',
'Helvetica');
saveas (CurPlot, CurGrowthPlotPath, "pdf");
```

IDLOutput.m

```
minTime = 382.4;
maxTime = 377.2;
stepSize = 0.02;

if (length(lastGarnetCode) == 0)
     # it's the first time through; output the file header
     fprintf(IDL_FID, "Name\tMaxR\t");

     t=minTime;
     do
          fprintf(IDL_FID, "%f\t", t);
          t = t - stepSize;
     until (t <= maxTime);
     fprintf(IDL_FID, "\n");
endif

if (length(lastGarnetCode) > 0) && (strcmp(garnetcode,
lastGarnetCode) == 0)
     # Output one line of the file for IDL to read

     # fit a line to the Age-Distance data for visualization
purposes only
     #    Option 1: this line is the best-fit line to the
whole dataset; it doesn't obey the nucleation time
     #    lineFit = polyfit (thisGarnetDistances,
thisGarnetAges, 1);
     # Option 2: make a line that connects the highest-Mn
and lowest-Mn points, to correctly reflect the nucleation
time while providing a reasonable growth progress
     #    First, find the core and rim points with times
     nucleationTime = 0;
     rimTime = 1000;
     rimDistance = 0;
     nucleationDistance = 100;
     for thisPoint = 1:length(thisGarnetAges)
          if (thisGarnetDistances(thisPoint) <
nucleationDistance)
               nucleationTime = thisGarnetAges(thisPoint);
               nucleationDistance = thisGarnetDistances(this
Point);
          endif
          if (thisGarnetDistances(thisPoint) > rimDistance)
               rimDistance = thisGarnetDistances(thisPoint);
               rimTime = thisGarnetAges(thisPoint);
```

```
          endif
     endfor
     slope = (rimTime - nucleationTime) / rimDistance;
     intercept = nucleationTime;

     fprintf(IDL_FID, "%s\t%f\t", lastGarnetCode, max(thisGa
rnetDistances));
     t=minTime;
     do
          radius = (t - intercept) / slope;
#         radius = (t - lineFit(2)) / lineFit(1);
          fprintf(IDL_FID, "%f\t", radius);

          t = t - stepSize;
     until (t <= maxTime);

     # clear the collection variables
     thisGarnetDistances = [];
     thisGarnetAges = [];
     fprintf(IDL_FID, "\n");
endif


# we have another file from the same garnet, so combine them
for thisPoint = 1:length(CurGarnetDistance)
     if (exist("thisGarnetDistances", "var"))
          thisGarnetDistances(end+1) = CurGarnetDistance(thi
sPoint);
          thisGarnetAges(end+1) = CurGarnetAge(thisPoint);
     else
          thisGarnetDistances(1) = CurGarnetDistance(thisPoi
nt);
          thisGarnetAges(1) = CurGarnetAge(thisPoint);
     endif
endfor

lastGarnetCode = garnetcode;
```

Appendix 2. EPMA Data (Digital)

Microprobe data presented here have not been culled, reorganized, or manipulated in any way.

Appendix 3. Mn-Ages

All garnet EPMA data (XMn and calculated distance from the core) have been put in order from closest to core to farthest.

GarnetAAcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.178	380.664	0.649	0
0.168	380.472	0.61	0.117
0.17	380.51	0.62	0.139
0.167	380.454	0.607	0.261
0.167	380.453	0.609	0.324
0.167	380.451	0.612	0.377
0.168	380.473	0.611	0.502
0.139	379.916	0.504	0.562
0.161	380.346	0.587	0.664
0.137	379.881	0.495	0.797
0.158	380.276	0.574	0.844
0.154	380.216	0.56	0.979
0.159	380.299	0.579	1.093
0.148	380.097	0.539	1.209
0.138	379.907	0.502	1.25
0.144	380.02	0.525	1.316
0.14	379.931	0.507	1.363
0.136	379.864	0.492	1.446
0.145	380.03	0.524	1.532
0.132	379.791	0.48	1.584
0.127	379.696	0.461	1.726
0.141	379.958	0.511	1.843
0.128	379.698	0.461	1.851
0.129	379.731	0.468	1.979
0.117	379.505	0.426	1.984
0.126	379.673	0.457	2.086
0.12	379.563	0.439	2.135
0.11	379.364	0.401	2.166
0.099	379.148	0.362	2.32
0.094	379.053	0.344	2.469
0.09	378.985	0.334	2.577
0.081	378.814	0.306	2.716
0.081	378.806	0.305	2.843
0.077	378.729	0.292	2.961
0.066	378.51	0.268	3.073
0.064	378.474	0.265	3.214
0.057	378.343	0.26	3.366
0.051	378.227	0.26	3.484
0.046	378.132	0.264	3.59
0.045	378.122	0.264	3.691
0.037	377.96	0.279	3.806
0.036	377.938	0.28	3.922
0.032	377.861	0.292	4.1
0.027	377.76	0.308	4.253
0.025	377.73	0.311	4.375
0.022	377.668	0.324	4.508
0.02	377.638	0.329	4.594
0.013	377.505	0.35	4.946
0.013	377.49	0.355	4.972
0.011	377.462	0.357	4.999
0.011	377.455	0.362	5.026
0.01	377.446	0.36	5.084
0.01	377.434	0.362	5.145
0.008	377.41	0.367	5.176
0.007	377.387	0.371	5.21
0.007	377.379	0.372	5.278
0.007	377.382	0.368	5.334
0.007	377.378	0.372	5.365
0.007	377.375	0.372	5.441
0.007	377.38	0.37	5.47
0.005	377.353	0.374	5.496
0.006	377.368	0.374	5.527
0.005	377.339	0.378	5.545

GarnetAAcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.133	379.795	0.479	1.573
0.145	380.037	0.526	1.702
0.16	380.327	0.583	1.756
0.169	380.504	0.621	1.839
0.14	379.945	0.508	1.844
0.149	380.109	0.539	1.863
0.161	380.342	0.587	1.887
0.171	380.539	0.627	1.913
0.141	379.954	0.51	2.079
0.128	379.699	0.467	2.183
0.131	379.761	0.472	2.306
0.124	379.633	0.45	2.422
0.135	379.842	0.493	2.672
0.135	379.839	0.488	2.775
0.132	379.791	0.479	2.852
0.123	379.605	0.441	2.972
0.12	379.549	0.434	3.072
0.111	379.384	0.405	3.205
0.097	379.112	0.357	3.291
0.1	379.176	0.368	3.363
0.106	379.283	0.384	3.491
0.097	379.104	0.355	3.63
0.089	378.95	0.328	3.724
0.085	378.873	0.316	3.823

0.083	378.845	0.309	3.977
0.077	378.731	0.295	4.1
0.064	378.484	0.266	4.345
0.054	378.28	0.261	4.522
0.044	378.086	0.267	4.661
0.041	378.039	0.273	4.802
0.037	377.953	0.279	4.946
0.03	377.831	0.296	5.111
0.024	377.715	0.314	5.277
0.02	377.641	0.328	5.395
0.015	377.532	0.346	5.546
0.013	377.504	0.352	5.677
0.008	377.406	0.368	5.787
0.007	377.381	0.371	5.9
0.006	377.363	0.377	5.98
0.005	377.346	0.377	6.067
0.005	377.344	0.376	6.136
0.005	377.352	0.377	6.187
0.007	377.377	0.372	6.235

GarnetABcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.039	378	0.275	0.259
0.037	377.956	0.281	0.37
0.037	377.961	0.281	0.461
0.032	377.869	0.292	0.535
0.031	377.849	0.295	0.682
0.031	377.847	0.294	0.761
0.025	377.721	0.316	0.862
0.02	377.624	0.329	0.971
0.012	377.479	0.356	1.103
0.01	377.445	0.359	1.213
0.01	377.437	0.362	1.334
0.011	377.451	0.359	1.439
0.009	377.421	0.363	1.577
0.01	377.436	0.361	1.679
0.008	377.396	0.368	1.707
0.008	377.406	0.368	1.814
0.007	377.39	0.371	1.903

GarnetABcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.041	378.027	0.273	0
0.04	378.024	0.274	0.113
0.04	378.012	0.273	0.178
0.038	377.988	0.276	0.3
0.036	377.932	0.283	0.448
0.034	377.897	0.287	0.574
0.033	377.877	0.291	0.707
0.03	377.816	0.299	0.853
0.028	377.781	0.305	0.933
0.026	377.74	0.311	1.117
0.022	377.678	0.321	1.202
0.019	377.614	0.331	1.342
0.016	377.552	0.344	1.558
0.013	377.503	0.35	1.661
0.012	377.477	0.353	1.743
0.011	377.456	0.356	1.858
0.008	377.407	0.365	1.98
0.006	377.37	0.372	2.131
0.005	377.34	0.378	2.278
0.007	377.373	0.373	2.403
0.005	377.338	0.379	2.47
0.006	377.36	0.376	2.565
0.005	377.349	0.377	2.672
0.008	377.404	0.368	2.706

GarnetABcurve3

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.037	377.951	0.281	0.469
0.038	377.972	0.277	0.485
0.038	377.976	0.279	0.494
0.039	377.993	0.276	0.518
0.035	377.914	0.284	0.614
0.033	377.878	0.291	0.648
0.033	377.891	0.287	0.709
0.032	377.854	0.293	0.788
0.031	377.836	0.296	0.893
0.028	377.782	0.306	1.029
0.026	377.742	0.31	1.207
0.023	377.683	0.32	1.294
0.018	377.6	0.333	1.416
0.017	377.565	0.338	1.542
0.013	377.497	0.352	1.679
0.011	377.454	0.358	1.833
0.009	377.426	0.363	1.912
0.007	377.388	0.37	2.024
0.006	377.36	0.375	2.185
0.006	377.36	0.375	2.33
0.007	377.375	0.373	2.417

GarnetACcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.098	379.139	0.362	0
0.096	379.098	0.352	0.064
0.092	379.018	0.339	0.147

0.092	379.02	0.34	0.2
0.081	378.814	0.305	0.386
0.074	378.676	0.287	0.594
0.063	378.462	0.265	0.804
0.052	378.256	0.26	1.144
0.041	378.031	0.273	1.404
0.04	378.007	0.275	1.71
0.039	377.991	0.277	2.024
0.02	377.622	0.331	2.356
0.01	377.443	0.36	2.702
0.006	377.363	0.373	2.996
0.005	377.347	0.377	3.185
0.005	377.35	0.377	3.214
0.005	377.347	0.377	3.217
0.006	377.363	0.376	3.231
0.005	377.345	0.379	3.253
0.006	377.37	0.372	3.265
0.006	377.366	0.373	3.273
0.005	377.352	0.375	3.284

GarnetACcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.098	379.139	0.359	0
0.091	379.002	0.339	0.212
0.081	378.803	0.305	0.424
0.08	378.778	0.299	0.632
0.074	378.67	0.286	0.806
0.065	378.503	0.266	1.075
0.057	378.337	0.26	1.293
0.048	378.179	0.261	1.598
0.04	378.013	0.274	1.829
0.03	377.823	0.299	2.267
0.031	377.836	0.296	2.458
0.025	377.734	0.311	2.647
0.018	377.596	0.333	2.899
0.007	377.376	0.372	3.261
0.007	377.387	0.37	3.41
0.007	377.386	0.371	3.631
0.007	377.381	0.373	3.736
0.006	377.363	0.374	3.769
0.007	377.379	0.372	3.818

GarnetADcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.042	378.058	0.271	0
0.037	377.954	0.282	0.184
0.041	378.042	0.271	0.188
0.04	378.018	0.274	0.277
0.036	377.935	0.282	0.335
0.03	377.824	0.298	0.48
0.026	377.754	0.309	0.7
0.018	377.593	0.333	0.914
0.017	377.58	0.336	1.062
0.014	377.524	0.346	1.212
0.012	377.478	0.353	1.411
0.011	377.455	0.355	1.542
0.009	377.416	0.365	1.622
0.007	377.378	0.372	1.735
0.006	377.361	0.373	1.909
0.006	377.36	0.376	2
0.006	377.365	0.374	2.117
0.007	377.375	0.372	2.205

GarnetADcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.037	377.967	0.278	0.182
0.035	377.929	0.282	0.306
0.036	377.948	0.281	0.379
0.036	377.945	0.282	0.503
0.029	377.798	0.301	0.551
0.037	377.96	0.278	0.651
0.02	377.635	0.328	0.793
0.038	377.97	0.279	0.847
0.019	377.618	0.329	0.952
0.015	377.531	0.344	1.148
0.012	377.482	0.353	1.339
0.006	377.354	0.375	1.581
0.006	377.37	0.375	1.77
0.009	377.412	0.368	1.931
0.009	377.425	0.362	2.071

GarnetAEcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.062	378.443	0.263	0.753
0.064	378.482	0.266	0.755
0.06	378.396	0.26	0.786
0.057	378.334	0.26	0.857
0.06	378.405	0.261	0.923
0.059	378.38	0.259	1.029
0.057	378.341	0.259	1.128
0.053	378.258	0.258	1.219
0.051	378.223	0.26	1.335
0.044	378.091	0.266	1.437
0.039	378.001	0.275	1.609
0.036	377.941	0.282	1.739
0.032	377.864	0.292	1.887

0.029	377.799	0.302	2.021
0.025	377.721	0.314	2.179
0.019	377.607	0.333	2.307
0.015	377.539	0.345	2.452
0.013	377.502	0.348	2.54
0.011	377.454	0.357	2.625
0.008	377.401	0.368	2.726
0.007	377.383	0.372	2.847
0.006	377.372	0.373	2.932
0.006	377.362	0.374	2.949
0.006	377.364	0.374	2.967
0.006	377.359	0.374	2.969

GarnetAEcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.081	378.808	0.305	0
0.075	378.694	0.288	0.143
0.075	378.691	0.289	0.168
0.073	378.656	0.284	0.304
0.069	378.578	0.274	0.349
0.068	378.564	0.273	0.405
0.059	378.381	0.261	0.555
0.066	378.522	0.27	0.627
0.046	378.141	0.263	0.729
0.06	378.408	0.261	0.78
0.036	377.946	0.281	0.887
0.054	378.289	0.26	0.905
0.017	377.573	0.338	1.513
0.014	377.517	0.347	1.705
0.01	377.44	0.36	1.854
0.011	377.454	0.359	2.026
0.011	377.456	0.357	2.145
0.01	377.447	0.358	2.246
0.008	377.394	0.368	2.41
0.007	377.381	0.37	2.476
0.007	377.381	0.371	2.534
0.009	377.419	0.366	2.628
0.01	377.432	0.362	2.675

GarnetAFcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.224	381.546	0.828	0.564
0.223	381.536	0.826	0.679
0.22	381.47	0.811	0.751
0.228	381.633	0.845	0.791
0.228	381.623	0.844	0.841
0.228	381.637	0.844	0.901
0.224	381.546	0.825	0.948
0.226	381.583	0.834	1.053
0.22	381.47	0.815	1.137
0.223	381.534	0.827	1.253
0.225	381.58	0.835	1.449
0.225	381.567	0.832	1.658
0.219	381.466	0.813	1.801
0.222	381.517	0.821	2.024
0.224	381.544	0.827	2.22
0.213	381.334	0.787	2.445
0.21	381.286	0.777	2.667
0.203	381.149	0.745	2.846
0.191	380.925	0.701	3.094
0.195	381.003	0.718	3.31
0.191	380.916	0.7	3.541
0.192	380.945	0.707	3.738
0.19	380.908	0.698	3.918
0.184	380.78	0.674	4.192
0.173	380.571	0.627	4.273
0.174	380.597	0.635	4.518
0.163	380.389	0.595	4.789
0.158	380.291	0.574	5.041
0.153	380.183	0.556	5.224
0.15	380.122	0.544	5.441
0.138	379.904	0.497	5.653
0.123	379.604	0.44	5.853
0.118	379.515	0.428	6.038
0.102	379.199	0.37	6.315
0.084	378.87	0.316	6.542
0.086	378.907	0.321	6.71
0.08	378.782	0.3	6.937
0.076	378.704	0.289	7.126
0.071	378.607	0.278	7.321
0.064	378.479	0.265	7.556
0.058	378.369	0.26	7.692
0.052	378.253	0.261	7.851
0.043	378.066	0.27	7.986
0.027	377.769	0.305	8.267
0.024	377.7	0.317	8.428
0.022	377.679	0.322	8.561
0.022	377.663	0.322	8.614
0.023	377.691	0.319	8.738
0.024	377.703	0.318	8.95
0.021	377.658	0.325	9.086
0.016	377.561	0.342	9.229
0.013	377.491	0.353	9.344
0.012	377.476	0.355	9.455
0.009	377.414	0.366	9.53
0.007	377.391	0.369	9.588
0.007	377.376	0.375	9.694
0.008	377.397	0.369	9.741
0.007	377.383	0.372	9.805
0.007	377.382	0.371	9.865

0.006	377.367	0.374	9.912
0.006	377.364	0.374	9.961
0.007	377.385	0.369	10.004

GarnetAFcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.237	381.796	0.879	0
0.228	381.633	0.84	0.294
0.232	381.706	0.862	0.515
0.218	381.441	0.809	0.705
0.226	381.591	0.837	0.943
0.223	381.538	0.827	1.139
0.23	381.665	0.85	1.349
0.219	381.451	0.809	1.498
0.225	381.576	0.831	1.689
0.225	381.579	0.834	1.91
0.22	381.474	0.815	2.134
0.224	381.545	0.826	2.308
0.181	380.724	0.66	2.483
0.161	380.338	0.583	3.191
0.171	380.542	0.619	3.577
0.191	380.928	0.702	3.871
0.189	380.877	0.691	4.088
0.196	381.021	0.723	4.341
0.189	380.873	0.689	4.681
0.183	380.764	0.666	4.968
0.166	380.43	0.602	5.3
0.169	380.487	0.614	5.549
0.159	380.309	0.581	5.721
0.15	380.134	0.543	5.907
0.14	379.948	0.509	6.173
0.122	379.601	0.444	6.442
0.116	379.476	0.422	6.661
0.101	379.194	0.37	6.812
0.082	378.819	0.307	7.002
0.077	378.725	0.293	7.175
0.058	378.364	0.26	7.461
0.044	378.086	0.268	7.726
0.037	377.951	0.28	7.957
0.031	377.845	0.297	8.185
0.023	377.69	0.32	8.416
0.016	377.548	0.343	8.629
0.012	377.476	0.354	8.827
0.009	377.425	0.364	8.883
0.009	377.42	0.363	8.885

GarnetAGcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.092	379.024	0.339	0
0.087	378.912	0.323	0.328
0.087	378.926	0.323	0.506
0.082	378.818	0.306	0.507
0.081	378.811	0.306	0.977
0.074	378.663	0.285	1.018
0.071	378.618	0.278	1.495
0.056	378.321	0.26	2.066
0.043	378.07	0.27	2.494
0.028	377.783	0.302	3.062
0.017	377.577	0.339	3.493
0.007	377.388	0.369	3.994
0.006	377.371	0.374	4.01
0.007	377.375	0.372	4.028
0.005	377.351	0.375	4.062
0.006	377.357	0.373	4.077
0.007	377.377	0.372	4.09
0.006	377.363	0.373	4.103
0.006	377.358	0.374	4.111

GarnetAGcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.092	379.024	0.339	0
0.089	378.95	0.33	0.369
0.085	378.88	0.317	0.389
0.087	378.918	0.323	0.623
0.07	378.585	0.275	1.041
0.059	378.389	0.26	1.313
0.05	378.218	0.26	1.649
0.043	378.066	0.269	2.009
0.03	377.821	0.298	2.384
0.018	377.589	0.338	2.818
0.012	377.48	0.354	3.123
0.009	377.414	0.365	3.493
0.006	377.365	0.376	3.851
0.006	377.363	0.373	3.887
0.008	377.399	0.368	3.901

GarnetAHcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.176	380.621	0.64	1.6
0.178	380.676	0.656	1.621
0.174	380.591	0.634	1.689
0.174	380.592	0.631	1.776
0.175	380.61	0.638	1.783
0.18	380.709	0.661	1.814
0.183	380.769	0.669	1.835
0.173	380.566	0.628	1.851

0.178	380.67	0.651	1.877
0.177	380.655	0.648	1.925
0.179	380.69	0.655	1.968
0.177	380.648	0.644	2.025
0.175	380.613	0.638	2.141
0.172	380.563	0.629	2.192
0.171	380.542	0.627	2.251
0.168	380.477	0.609	2.322
0.169	380.488	0.615	2.381
0.167	380.46	0.609	2.444
0.159	380.309	0.582	2.529
0.159	380.298	0.575	2.589
0.153	380.184	0.554	2.668
0.15	380.123	0.543	2.746
0.151	380.15	0.549	2.819
0.143	380	0.52	2.891
0.143	379.992	0.518	2.983
0.144	380.011	0.523	3.05
0.139	379.913	0.501	3.166
0.132	379.785	0.476	3.257
0.128	379.712	0.465	3.348
0.125	379.641	0.451	3.418
0.123	379.607	0.444	3.495
0.118	379.511	0.424	3.58
0.116	379.468	0.418	3.684
0.113	379.413	0.411	3.773
0.11	379.361	0.397	3.867
0.105	379.257	0.38	3.957
0.098	379.132	0.358	4.063
0.092	379.01	0.34	4.19
0.089	378.954	0.329	4.299
0.083	378.84	0.309	4.427
0.069	378.573	0.273	4.646
0.071	378.616	0.279	4.727
0.063	378.457	0.264	4.858
0.061	378.411	0.262	4.958
0.055	378.298	0.26	5.117
0.049	378.193	0.261	5.259
0.045	378.113	0.266	5.387
0.044	378.098	0.266	5.533
0.04	378.024	0.276	5.675
0.036	377.942	0.282	5.769
0.034	377.892	0.288	5.87
0.032	377.861	0.292	5.96
0.032	377.872	0.291	6.046
0.031	377.837	0.296	6.136
0.026	377.755	0.308	6.255
0.025	377.736	0.31	6.335
0.021	377.658	0.325	6.426
0.019	377.62	0.332	6.51
0.016	377.554	0.341	6.596
0.017	377.572	0.339	6.636
0.014	377.519	0.347	6.653
0.014	377.511	0.348	6.728
0.011	377.459	0.358	6.802
0.01	377.435	0.361	6.835
0.008	377.41	0.366	6.912
0.008	377.404	0.367	6.937

GarnetAHcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.189	380.879	0.696	0
0.182	380.755	0.668	0.145
0.185	380.813	0.68	0.179
0.188	380.87	0.688	0.314
0.185	380.806	0.678	0.432
0.185	380.809	0.674	0.449
0.184	380.788	0.673	0.589
0.184	380.79	0.674	0.678
0.188	380.864	0.689	0.784
0.184	380.79	0.676	0.874
0.182	380.748	0.665	0.896
0.185	380.799	0.677	0.981
0.18	380.717	0.658	0.993
0.181	380.718	0.658	1.134
0.183	380.765	0.668	1.174
0.185	380.811	0.678	1.291
0.182	380.739	0.661	1.314
0.184	380.787	0.673	1.456
0.183	380.773	0.669	1.486
0.179	380.692	0.654	1.604
0.177	380.655	0.649	1.626
0.179	380.688	0.652	1.732
0.175	380.604	0.635	1.882
0.173	380.579	0.635	1.951
0.171	380.529	0.621	2.052
0.167	380.452	0.61	2.151
0.17	380.52	0.619	2.189
0.17	380.513	0.617	2.262
0.161	380.341	0.584	2.459
0.154	380.212	0.556	2.659
0.146	380.047	0.529	2.983
0.141	379.956	0.511	3.114
0.136	379.853	0.493	3.221
0.133	379.811	0.484	3.384
0.13	379.738	0.467	3.529
0.118	379.525	0.433	3.688
0.114	379.447	0.415	3.914
0.109	379.347	0.395	4.005
0.101	379.18	0.368	4.136
0.097	379.107	0.354	4.27
0.092	379.021	0.337	4.421

0.086	378.909	0.322	4.538
0.084	378.858	0.313	4.667
0.082	378.821	0.306	4.782
0.078	378.74	0.295	4.889
0.074	378.667	0.285	5.023
0.066	378.509	0.269	5.178
0.063	378.463	0.264	5.331
0.064	378.471	0.265	5.448
0.058	378.363	0.26	5.607
0.053	378.267	0.26	5.769
0.049	378.194	0.261	5.905
0.047	378.143	0.264	6.06
0.042	378.052	0.27	6.231
0.042	378.063	0.271	6.279
0.041	378.039	0.271	6.308
0.042	378.047	0.271	6.337
0.039	377.994	0.277	6.385
0.036	377.942	0.281	6.439
0.028	377.789	0.303	6.721
0.029	377.8	0.302	6.754
0.031	377.841	0.296	6.79
0.028	377.777	0.307	6.872
0.025	377.727	0.312	6.923
0.026	377.75	0.311	6.955
0.023	377.693	0.318	7.004
0.022	377.666	0.323	7.029
0.02	377.631	0.328	7.07
0.019	377.604	0.334	7.094
0.019	377.608	0.333	7.114

GarnetAIcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.19	380.899	0.697	0
0.188	380.866	0.69	0.346
0.186	380.832	0.684	0.564
0.185	380.798	0.673	0.776
0.164	380.395	0.596	1.418
0.181	380.735	0.661	1.69
0.182	380.741	0.665	2.065
0.169	380.486	0.614	2.339
0.162	380.369	0.589	2.743
0.148	380.098	0.538	3.397
0.134	379.83	0.486	3.809
0.129	379.72	0.465	4.158
0.133	379.81	0.482	4.481
0.129	379.727	0.468	4.788
0.112	379.402	0.406	5.196
0.111	379.377	0.403	5.534
0.108	379.315	0.392	5.879
0.096	379.09	0.352	6.225
0.087	378.922	0.325	6.575
0.077	378.735	0.294	6.909
0.078	378.743	0.295	7.242
0.063	378.45	0.263	7.926
0.057	378.345	0.26	8.307
0.051	378.237	0.26	8.667
0.038	377.976	0.278	8.998
0.03	377.831	0.298	9.389
0.023	377.688	0.319	9.729
0.015	377.538	0.344	10.018
0.007	377.387	0.37	10.459
0.009	377.419	0.364	10.617
0.01	377.448	0.359	10.771
0.009	377.429	0.364	10.977
0.008	377.398	0.368	11.102

GarnetAIcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.19	380.899	0.698	0
0.185	380.795	0.673	0.714
0.182	380.738	0.664	0.762
0.179	380.689	0.652	0.785
0.177	380.64	0.644	0.899
0.184	380.785	0.671	0.988
0.183	380.765	0.671	1.059
0.189	380.882	0.692	1.178
0.16	380.323	0.581	1.211
0.176	380.623	0.639	1.359
0.165	380.427	0.602	1.503
0.152	380.176	0.554	1.802
0.166	380.442	0.605	1.991
0.171	380.533	0.624	2.18
0.168	380.483	0.612	2.388
0.168	380.481	0.609	2.619
0.168	380.482	0.613	2.853
0.167	380.458	0.605	3.117
0.163	380.373	0.591	3.386
0.163	380.376	0.592	3.599
0.161	380.342	0.586	3.914
0.133	379.806	0.484	4.182
0.089	378.952	0.327	4.511
0.052	378.239	0.258	4.838
0.06	378.394	0.261	5.187
0.076	378.712	0.291	5.471
0.082	378.833	0.308	5.627
0.076	378.714	0.291	5.738
0.045	378.111	0.266	6.057
0.031	377.853	0.294	6.469
0.041	378.027	0.274	6.688
0.04	378.019	0.274	6.926

0.063	378.461	0.265	7.129
0.055	378.312	0.259	7.252
0.05	378.207	0.26	7.393
0.053	378.26	0.259	7.519
0.046	378.125	0.265	7.649
0.043	378.078	0.269	7.826
0.035	377.911	0.286	8.019
0.029	377.804	0.303	8.173
0.026	377.743	0.309	8.296
0.021	377.652	0.325	8.432
0.014	377.515	0.348	8.573
0.012	377.478	0.355	8.67
0.011	377.458	0.357	8.714
0.011	377.456	0.358	8.728

GarnetAJcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.225	381.573	0.835	0
0.222	381.508	0.817	0.11
0.223	381.54	0.823	0.127
0.225	381.569	0.836	0.259
0.207	381.235	0.762	0.272
0.212	381.324	0.781	0.337
0.22	381.486	0.816	0.453
0.21	381.286	0.778	0.511
0.201	381.112	0.742	0.592
0.201	381.106	0.738	0.714
0.199	381.067	0.731	0.818
0.206	381.204	0.762	1.023
0.209	381.272	0.77	1.115
0.202	381.138	0.747	1.473
0.198	381.046	0.731	1.595
0.177	380.658	0.648	1.683
0.189	380.888	0.695	1.938
0.189	380.883	0.692	2.064
0.187	380.838	0.685	2.209
0.177	380.658	0.648	2.305
0.179	380.697	0.654	2.436
0.175	380.618	0.643	2.541
0.171	380.536	0.623	2.639
0.153	380.189	0.556	2.711
0.161	380.337	0.587	2.782
0.158	380.292	0.576	2.885
0.151	380.158	0.549	2.956
0.155	380.233	0.563	3.046
0.15	380.137	0.546	3.182
0.143	379.997	0.519	3.284
0.125	379.66	0.455	3.472
0.131	379.757	0.472	3.572
0.13	379.737	0.469	3.666
0.128	379.71	0.464	3.778
0.128	379.711	0.461	3.906
0.12	379.549	0.432	4.028
0.114	379.432	0.411	4.178
0.116	379.482	0.419	4.307
0.108	379.323	0.393	4.444
0.101	379.183	0.366	4.553
0.089	378.965	0.331	4.668
0.066	378.526	0.269	4.862
0.074	378.68	0.286	4.993
0.069	378.565	0.273	5.099
0.066	378.508	0.267	5.194
0.064	378.473	0.265	5.313
0.059	378.39	0.262	5.463
0.052	378.25	0.26	5.551
0.05	378.218	0.26	5.654
0.043	378.082	0.269	5.83
0.039	378.004	0.274	5.934
0.036	377.938	0.283	6.051
0.032	377.859	0.293	6.194
0.03	377.821	0.299	6.348
0.03	377.821	0.3	6.415
0.026	377.741	0.311	6.475
0.022	377.672	0.321	6.553
0.023	377.685	0.319	6.603
0.019	377.621	0.328	6.692
0.017	377.58	0.336	6.775
0.016	377.56	0.34	6.833
0.016	377.547	0.342	6.92
0.013	377.494	0.35	6.975
0.012	377.483	0.353	7.054
0.012	377.476	0.356	7.101
0.01	377.434	0.362	7.132
0.008	377.407	0.366	7.187
0.009	377.417	0.365	7.246
0.009	377.42	0.364	7.28
0.007	377.382	0.372	7.321
0.006	377.365	0.376	7.366
0.007	377.375	0.37	7.433
0.006	377.355	0.375	7.48
0.008	377.397	0.369	7.561
0.006	377.354	0.375	7.621
0.004	377.332	0.379	7.689
0.005	377.341	0.379	7.747
0.006	377.368	0.375	7.794

GarnetAJcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.225	381.573	0.835	0
0.218	381.442	0.808	0.142

0.213	381.341	0.785	0.248
0.175	380.612	0.639	0.373
0.174	380.588	0.635	0.792
0.179	380.692	0.657	0.976
0.183	380.761	0.671	1.037
0.181	380.736	0.662	1.12
0.18	380.7	0.656	1.238
0.181	380.719	0.659	1.397
0.174	380.599	0.636	1.499
0.173	380.568	0.627	1.566
0.162	380.355	0.587	1.755
0.152	380.169	0.552	1.897
0.146	380.061	0.533	2.077
0.134	379.829	0.487	2.236
0.121	379.567	0.435	2.399
0.093	379.036	0.342	2.735
0.075	378.682	0.287	2.892
0.056	378.316	0.261	3.045
0.067	378.542	0.272	3.768
0.065	378.503	0.268	3.929
0.065	378.5	0.266	4.073
0.058	378.37	0.261	4.25
0.059	378.385	0.26	4.369
0.071	378.609	0.278	4.594
0.066	378.515	0.269	4.789
0.071	378.614	0.279	4.971
0.069	378.566	0.273	5.108
0.069	378.573	0.275	5.205
0.063	378.453	0.264	5.338
0.064	378.486	0.267	5.488
0.061	378.411	0.261	5.631
0.061	378.411	0.261	5.781
0.051	378.227	0.261	5.984
0.043	378.081	0.268	6.155
0.037	377.954	0.281	6.339
0.026	377.739	0.311	6.601
0.021	377.642	0.328	6.767
0.018	377.589	0.336	6.845
0.016	377.551	0.343	6.913
0.014	377.509	0.35	6.962
0.007	377.378	0.375	7.178
0.008	377.404	0.37	7.229
0.007	377.378	0.371	7.255
0.008	377.396	0.37	7.318
0.007	377.389	0.37	7.379
0.008	377.401	0.367	7.382

GarnetALcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.225	381.571	0.833	1.253
0.228	381.635	0.845	1.253
0.224	381.545	0.826	1.309
0.218	381.44	0.809	1.341
0.219	381.462	0.813	1.411
0.216	381.394	0.796	1.571
0.217	381.416	0.802	1.628
0.226	381.596	0.835	1.703
0.218	381.447	0.807	1.787
0.211	381.299	0.778	1.902
0.203	381.154	0.745	2.647
0.191	380.91	0.699	2.762
0.198	381.058	0.729	2.849
0.204	381.163	0.752	2.919
0.197	381.043	0.727	3.096
0.195	380.992	0.713	3.265
0.2	381.091	0.74	3.401
0.178	380.671	0.651	3.468
0.186	380.817	0.677	3.538
0.141	379.965	0.513	4.113
0.142	379.978	0.517	4.161
0.146	380.057	0.528	4.319
0.156	380.252	0.567	4.416
0.155	380.232	0.562	4.565
0.149	380.114	0.541	4.671
0.138	379.899	0.499	4.845
0.136	379.853	0.491	5.049
0.129	379.726	0.468	5.175
0.125	379.65	0.452	5.299
0.121	379.58	0.439	5.458
0.111	379.373	0.399	5.651
0.108	379.333	0.395	5.818
0.099	379.158	0.363	5.933
0.093	379.042	0.343	6.13
0.089	378.953	0.327	6.247
0.083	378.845	0.312	6.378
0.075	378.687	0.289	6.576
0.067	378.541	0.271	6.66
0.063	378.461	0.264	6.819
0.061	378.414	0.263	6.992
0.056	378.325	0.26	7.165
0.057	378.341	0.26	7.254
0.055	378.297	0.259	7.327
0.05	378.201	0.262	7.439
0.048	378.173	0.261	7.525
0.039	377.998	0.276	7.618
0.042	378.052	0.27	7.665
0.036	377.945	0.281	7.744
0.036	377.936	0.283	7.8
0.03	377.828	0.296	7.88
0.027	377.775	0.305	7.944
0.026	377.748	0.309	7.999
0.022	377.678	0.321	8.103

0.025	377.729	0.314	8.122
0.026	377.75	0.311	8.153
0.02	377.629	0.331	8.3
0.015	377.527	0.348	8.415
0.016	377.546	0.342	8.464
0.013	377.497	0.35	8.527
0.007	377.387	0.371	8.673
0.007	377.374	0.371	8.74

GarnetALcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.238	381.823	0.888	0
0.231	381.695	0.862	0.161
0.231	381.693	0.856	0.228
0.235	381.764	0.873	0.311
0.233	381.722	0.861	0.406
0.23	381.664	0.855	0.448
0.224	381.547	0.827	0.557
0.237	381.799	0.881	0.566
0.224	381.555	0.828	0.679
0.224	381.556	0.83	0.704
0.226	381.585	0.837	0.883
0.226	381.601	0.839	0.921
0.226	381.594	0.839	0.994
0.222	381.518	0.828	1.066
0.224	381.554	0.826	1.198
0.226	381.597	0.839	1.259
0.227	381.607	0.838	1.353
0.218	381.445	0.808	1.553
0.221	381.492	0.814	1.647
0.221	381.504	0.821	1.816
0.219	381.464	0.81	1.973
0.221	381.489	0.812	2.096
0.212	381.329	0.782	2.231
0.215	381.374	0.792	2.379
0.212	381.318	0.778	2.59
0.203	381.149	0.749	2.759
0.211	381.312	0.781	2.91
0.201	381.111	0.736	3.027
0.203	381.147	0.748	3.17
0.202	381.125	0.739	3.283
0.199	381.066	0.729	3.421
0.203	381.142	0.741	3.569
0.2	381.1	0.737	3.698
0.193	380.959	0.709	3.863
0.193	380.957	0.708	3.979
0.19	380.894	0.696	4.19
0.189	380.888	0.698	4.324
0.182	380.743	0.665	4.458
0.187	380.835	0.685	4.578
0.179	380.68	0.655	4.708
0.179	380.697	0.656	4.82
0.181	380.727	0.663	4.946
0.157	380.266	0.57	5.33
0.158	380.292	0.579	5.396
0.157	380.256	0.568	5.576
0.151	380.154	0.549	5.658
0.146	380.057	0.53	5.825
0.145	380.041	0.526	5.951
0.134	379.822	0.484	6.211
0.128	379.714	0.466	6.399
0.12	379.552	0.435	6.67
0.115	379.466	0.419	6.801
0.108	379.319	0.393	6.936
0.104	379.251	0.379	7.093
0.084	378.864	0.314	7.439
0.081	378.812	0.306	7.669
0.075	378.697	0.288	7.855
0.072	378.629	0.28	7.997
0.053	378.267	0.259	8.243
0.053	378.267	0.259	8.33
0.045	378.114	0.265	8.454
0.044	378.093	0.266	8.575
0.041	378.031	0.272	8.748
0.039	378.004	0.275	8.832
0.035	377.914	0.285	8.983
0.028	377.788	0.303	9.241
0.024	377.702	0.316	9.386
0.02	377.632	0.329	9.482
0.014	377.523	0.348	9.597
0.008	377.408	0.368	9.629
0.007	377.389	0.37	9.757

GarnetAMcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.102	379.205	0.372	1.863
0.103	379.237	0.376	1.919
0.099	379.149	0.361	1.919
0.105	379.274	0.385	1.994
0.104	379.249	0.38	2.055
0.103	379.219	0.375	2.156
0.096	379.087	0.353	2.302
0.101	379.195	0.37	2.574
0.098	379.128	0.357	2.779
0.089	378.962	0.33	2.933
0.082	378.825	0.307	3.044
0.08	378.789	0.303	3.182
0.069	378.57	0.273	3.393
0.056	378.328	0.26	3.569
0.056	378.322	0.26	3.766

0.046	378.133	0.264	3.937
0.037	377.961	0.28	4.186
0.031	377.841	0.296	4.439
0.021	377.659	0.322	4.791
0.012	377.474	0.355	5.097
0.01	377.436	0.363	5.16
0.008	377.41	0.367	5.289
0.007	377.384	0.37	5.359
0.007	377.384	0.371	5.416
0.007	377.379	0.372	5.493
0.006	377.361	0.373	5.549
0.006	377.356	0.375	5.615
0.007	377.375	0.375	5.638

GarnetAMcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.173	380.577	0.634	0
0.149	380.103	0.538	0.428
0.154	380.21	0.56	0.431
0.134	379.818	0.486	0.736
0.138	379.902	0.499	0.972
0.117	379.492	0.422	1.083
0.116	379.469	0.418	1.465
0.068	378.563	0.273	1.622
0.109	379.35	0.396	1.766
0.058	378.372	0.259	1.99
0.096	379.09	0.351	2.071
0.02	377.634	0.327	3.273
0.019	377.608	0.331	3.9
0.016	377.548	0.341	4.379
0.016	377.554	0.339	4.785
0.011	377.467	0.357	5.126

GarnetANcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.247	381.993	0.924	0
0.241	381.885	0.895	0.159
0.24	381.862	0.89	0.292
0.245	381.956	0.906	0.338
0.245	381.95	0.913	0.476
0.235	381.769	0.87	0.703
0.237	381.801	0.877	0.856
0.24	381.859	0.892	0.982
0.233	381.725	0.863	1.119
0.234	381.753	0.872	1.286
0.236	381.784	0.878	1.435
0.228	381.635	0.846	1.624
0.218	381.444	0.805	1.713
0.205	381.197	0.757	1.994
0.207	381.232	0.765	2.159
0.201	381.12	0.741	2.339
0.211	381.295	0.776	2.539
0.218	381.429	0.804	2.684
0.207	381.232	0.765	2.858
0.205	381.193	0.759	3.017
0.203	381.156	0.748	3.158
0.2	381.083	0.733	3.317
0.189	380.885	0.694	3.465
0.194	380.986	0.713	3.596
0.194	380.985	0.718	3.791
0.194	380.984	0.715	3.964
0.185	380.801	0.678	4.071
0.186	380.82	0.685	4.267
0.185	380.801	0.68	4.408
0.181	380.722	0.662	4.572
0.167	380.462	0.613	4.749
0.12	379.555	0.436	4.947
0.078	378.751	0.297	5.13
0.026	377.746	0.31	5.747
0.046	378.124	0.265	5.923
0.054	378.278	0.26	6.075
0.05	378.213	0.26	6.208
0.048	378.17	0.262	6.393
0.054	378.288	0.259	6.513
0.052	378.247	0.26	6.656
0.044	378.095	0.267	6.774
0.033	377.876	0.291	6.994
0.031	377.846	0.295	7.149
0.029	377.808	0.3	7.302
0.028	377.789	0.305	7.432
0.027	377.772	0.306	7.525
0.023	377.692	0.32	7.634
0.011	377.467	0.356	7.737
0.008	377.411	0.367	7.751
0.009	377.417	0.365	7.775
0.007	377.391	0.369	7.785
0.009	377.414	0.367	7.791

GarnetANcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.24	381.87	0.892	0.755
0.237	381.81	0.88	0.768
0.24	381.861	0.893	0.782
0.23	381.675	0.855	0.79
0.244	381.944	0.913	0.801
0.229	381.657	0.85	0.88
0.24	381.86	0.893	0.971
0.243	381.913	0.899	1.123

0.232	381.707	0.856	1.285
0.236	381.789	0.879	1.429
0.238	381.814	0.886	1.611
0.231	381.697	0.858	1.831
0.23	381.662	0.853	1.948
0.219	381.465	0.815	2.19
0.224	381.555	0.831	2.39
0.21	381.279	0.774	2.589
0.212	381.322	0.782	2.789
0.214	381.371	0.792	2.967
0.198	381.049	0.728	3.202
0.205	381.186	0.756	3.396
0.196	381.016	0.717	3.6
0.192	380.945	0.706	3.803
0.194	380.977	0.711	3.99
0.188	380.854	0.686	4.369
0.188	380.864	0.692	4.476
0.186	380.816	0.682	4.619
0.183	380.764	0.671	4.805
0.18	380.701	0.657	5.043
0.168	380.484	0.614	5.264
0.16	380.317	0.577	5.457
0.152	380.162	0.553	5.657
0.148	380.095	0.538	5.876
0.141	379.961	0.512	6.058
0.125	379.641	0.451	6.272
0.119	379.535	0.432	6.466
0.113	379.428	0.411	6.662
0.098	379.137	0.36	6.952
0.096	379.096	0.352	7.145
0.085	378.89	0.318	7.349
0.075	378.695	0.289	7.579
0.065	378.492	0.266	7.766
0.053	378.264	0.259	7.994
0.04	378.024	0.272	8.247
0.037	377.951	0.28	8.419
0.031	377.849	0.295	8.623
0.027	377.76	0.308	8.861
0.024	377.706	0.319	9.02
0.011	377.458	0.358	9.317
0.009	377.416	0.364	9.479
0.006	377.369	0.373	9.857
0.005	377.344	0.379	9.904
0.006	377.354	0.378	9.931
0.005	377.353	0.377	9.992
0.008	377.392	0.368	10.012

GarnetAOcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.112	379.406	0.407	0
0.101	379.181	0.367	0.365
0.098	379.129	0.357	0.457
0.074	378.661	0.283	0.704
0.067	378.543	0.271	0.952
0.071	378.607	0.277	1.559
0.075	378.697	0.288	1.816
0.078	378.749	0.297	2.149
0.072	378.637	0.281	2.406
0.063	378.454	0.265	2.698
0.057	378.346	0.259	3.042
0.053	378.275	0.259	3.365
0.048	378.166	0.261	3.649
0.04	378.021	0.274	3.963
0.036	377.946	0.28	4.274
0.037	377.958	0.28	4.564
0.031	377.851	0.294	4.865
0.024	377.702	0.317	5.22
0.021	377.646	0.325	5.463
0.015	377.545	0.343	5.726
0.01	377.434	0.361	6.05
0.007	377.376	0.371	6.341
0.005	377.341	0.378	6.618
0.005	377.342	0.377	6.655
0.006	377.361	0.374	6.7
0.005	377.346	0.379	6.723
0.005	377.352	0.377	6.74
0.005	377.349	0.377	6.759
0.006	377.366	0.373	6.902
0.008	377.396	0.37	6.925
0.007	377.387	0.37	6.962

GarnetAOcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.112	379.406	0.409	0
0.11	379.371	0.402	0.305
0.105	379.266	0.379	0.593
0.081	378.798	0.304	0.861
0.088	378.934	0.326	1.201
0.067	378.533	0.271	1.52
0.04	378.022	0.273	2.23
0.029	377.805	0.3	2.551
0.022	377.661	0.32	2.929
0.009	377.418	0.366	3.307
0.008	377.396	0.371	3.698
0.007	377.378	0.372	3.909
0.008	377.395	0.37	4.346
0.006	377.37	0.374	4.779
0.006	377.355	0.376	4.963
0.007	377.373	0.374	5.108

GarnetAPcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.231	381.696	0.855	0
0.219	381.461	0.81	0.342
0.224	381.553	0.828	0.379
0.219	381.462	0.811	0.401
0.223	381.534	0.823	0.444
0.222	381.524	0.826	0.464
0.224	381.544	0.827	0.533
0.203	381.146	0.744	0.615
0.223	381.526	0.824	0.622
0.206	381.204	0.755	0.68
0.201	381.113	0.743	0.897
0.199	381.076	0.733	1.012
0.174	380.601	0.637	1.492
0.161	380.345	0.588	1.811
0.155	380.235	0.564	1.944
0.157	380.274	0.572	2.249
0.155	380.233	0.565	2.349
0.143	380.006	0.523	2.529
0.163	380.377	0.59	2.748
0.156	380.251	0.568	2.811
0.152	380.168	0.552	2.994
0.145	380.034	0.525	3.143
0.149	380.11	0.54	3.318
0.153	380.181	0.552	3.453
0.144	380.014	0.522	3.565
0.155	380.232	0.564	3.673
0.144	380.013	0.522	3.89
0.125	379.656	0.456	4.042
0.122	379.6	0.442	4.097
0.122	379.59	0.442	4.225
0.122	379.593	0.441	4.366
0.117	379.5	0.424	4.463
0.115	379.467	0.417	4.592
0.124	379.623	0.45	4.719
0.11	379.371	0.402	4.836
0.107	379.302	0.388	4.989
0.102	379.212	0.373	5.104
0.096	379.086	0.35	5.229
0.091	378.999	0.333	5.341
0.082	378.833	0.309	5.448
0.086	378.898	0.318	5.542
0.082	378.824	0.306	5.682
0.079	378.77	0.299	5.751
0.077	378.723	0.291	5.838
0.067	378.542	0.271	5.967
0.067	378.537	0.272	6.091
0.063	378.451	0.265	6.207
0.056	378.327	0.259	6.319
0.054	378.281	0.259	6.453
0.047	378.157	0.263	6.556
0.045	378.121	0.265	6.693
0.041	378.032	0.273	6.792
0.041	378.039	0.272	6.899
0.038	377.987	0.277	7.02
0.033	377.882	0.291	7.146
0.031	377.844	0.295	7.26
0.03	377.816	0.3	7.377
0.026	377.738	0.313	7.51
0.025	377.721	0.312	7.632
0.023	377.69	0.319	7.748
0.018	377.597	0.336	7.782
0.016	377.56	0.34	7.831
0.013	377.498	0.35	7.872
0.014	377.509	0.351	7.918
0.012	377.477	0.356	7.974
0.009	377.424	0.363	8.027
0.008	377.41	0.366	8.073
0.008	377.396	0.367	8.117
0.007	377.373	0.373	8.147
0.006	377.359	0.375	8.198
0.006	377.366	0.371	8.235
0.009	377.412	0.367	8.267

GarnetAPcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.172	380.555	0.628	4.428
0.175	380.605	0.637	4.552
0.181	380.719	0.663	4.654
0.182	380.752	0.671	4.753
0.183	380.771	0.671	4.847
0.179	380.698	0.656	5.01
0.173	380.567	0.626	5.186
0.173	380.573	0.631	5.311
0.169	380.491	0.614	5.455
0.159	380.31	0.579	5.712
0.155	380.225	0.563	5.81
0.149	380.117	0.54	5.931
0.148	380.086	0.537	6.079
0.136	379.858	0.492	6.258
0.132	379.792	0.478	6.39
0.131	379.764	0.474	6.575
0.125	379.652	0.452	6.697
0.111	379.375	0.402	7.034
0.104	379.241	0.379	7.18
0.102	379.204	0.372	7.325
0.094	379.05	0.346	7.473
0.089	378.965	0.329	7.702
0.082	378.822	0.305	7.873

0.075	378.695	0.288	7.992
0.068	378.562	0.275	8.186
0.062	378.448	0.263	8.297
0.059	378.376	0.26	8.413
0.047	378.157	0.262	8.571
0.043	378.071	0.269	8.801
0.042	378.051	0.27	8.903
0.04	378.014	0.274	8.993
0.035	377.921	0.283	9.117
0.028	377.78	0.306	9.224
0.028	377.78	0.303	9.313
0.025	377.734	0.313	9.42
0.021	377.645	0.326	9.59
0.017	377.579	0.337	9.737
0.014	377.525	0.346	9.877
0.009	377.419	0.363	10.031
0.009	377.418	0.363	10.131
0.008	377.393	0.37	10.264
0.005	377.345	0.38	10.348
0.005	377.347	0.379	10.429
0.006	377.364	0.374	10.531
0.007	377.375	0.372	10.572

GarnetAQcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.197	381.039	0.723	0
0.19	380.891	0.692	0.199
0.194	380.976	0.714	0.363
0.178	380.675	0.653	0.52
0.192	380.931	0.703	0.705
0.182	380.754	0.67	0.837
0.179	380.698	0.658	1.028
0.173	380.573	0.633	1.229
0.168	380.469	0.611	1.437
0.175	380.615	0.64	1.628
0.156	380.252	0.569	1.854
0.147	380.083	0.534	2.068
0.15	380.126	0.545	2.253
0.134	379.823	0.483	2.508
0.121	379.569	0.437	2.683
0.11	379.366	0.4	2.918
0.105	379.256	0.381	3.194
0.1	379.178	0.366	3.408
0.097	379.112	0.356	3.63
0.085	378.885	0.316	3.875
0.079	378.767	0.299	3.993
0.073	378.657	0.285	4.277
0.06	378.41	0.262	4.511
0.054	378.282	0.26	4.757
0.046	378.129	0.264	4.989
0.039	377.991	0.276	5.245
0.032	377.854	0.293	5.451
0.031	377.84	0.294	5.633
0.025	377.721	0.314	5.831
0.019	377.612	0.33	6.079
0.012	377.487	0.353	6.31
0.012	377.475	0.356	6.36
0.011	377.461	0.355	6.459
0.01	377.445	0.362	6.523
0.009	377.426	0.364	6.574
0.008	377.394	0.369	6.703
0.008	377.394	0.369	6.769
0.006	377.362	0.374	6.846
0.006	377.372	0.374	6.931
0.005	377.348	0.378	7.021
0.006	377.355	0.374	7.099
0.006	377.369	0.372	7.156
0.006	377.359	0.372	7.194

GarnetAQcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.181	380.722	0.666	0.925
0.179	380.687	0.651	0.936
0.186	380.823	0.68	0.937
0.181	380.72	0.663	0.994
0.176	380.63	0.644	1.08
0.179	380.695	0.658	1.116
0.175	380.603	0.639	1.169
0.187	380.845	0.688	1.224
0.157	380.259	0.571	1.309
0.132	379.788	0.481	1.616
0.131	379.766	0.475	2.281
0.117	379.504	0.426	2.499
0.11	379.364	0.4	2.562
0.081	378.803	0.304	3.07
0.084	378.855	0.313	3.287
0.064	378.475	0.266	3.545
0.055	378.311	0.259	3.862
0.049	378.194	0.261	4.123
0.047	378.144	0.263	4.43
0.038	377.974	0.278	4.646
0.034	377.892	0.287	4.854
0.025	377.724	0.312	5.108
0.021	377.651	0.325	5.314
0.015	377.538	0.345	5.587
0.012	377.483	0.356	5.827
0.007	377.391	0.369	6.092
0.006	377.37	0.373	6.318
0.006	377.362	0.374	6.53
0.006	377.361	0.374	6.74

GarnetARcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.12	379.562	0.434	0
0.117	379.504	0.426	0.113
0.106	379.288	0.385	0.183
0.113	379.411	0.409	0.222
0.106	379.28	0.383	0.23
0.105	379.273	0.385	0.317
0.114	379.433	0.412	0.355
0.1	379.173	0.366	0.476
0.096	379.1	0.354	0.556
0.102	379.205	0.375	0.637
0.079	378.766	0.3	0.638
0.075	378.687	0.287	0.678
0.116	379.471	0.418	0.734
0.075	378.696	0.288	0.743
0.117	379.504	0.427	0.819
0.069	378.572	0.275	0.834
0.108	379.317	0.391	0.893
0.105	379.265	0.379	0.956
0.065	378.493	0.267	0.982
0.099	379.151	0.36	1.039
0.062	378.431	0.262	1.088
0.055	378.299	0.26	1.262
0.055	378.31	0.259	1.36
0.052	378.248	0.261	1.482
0.047	378.156	0.262	1.607
0.043	378.075	0.269	1.736
0.039	377.996	0.276	1.87
0.037	377.96	0.279	1.981
0.035	377.927	0.283	2.135
0.032	377.869	0.291	2.242
0.029	377.806	0.301	2.376
0.027	377.765	0.307	2.521
0.021	377.643	0.327	2.663
0.016	377.56	0.34	2.802
0.015	377.535	0.346	2.918
0.012	377.472	0.357	3.031
0.008	377.399	0.367	3.197
0.006	377.368	0.372	3.345
0.005	377.352	0.376	3.449
0.005	377.351	0.376	3.493
0.006	377.355	0.377	3.518
0.003	377.308	0.384	3.574
0.004	377.328	0.38	3.602
0.005	377.342	0.377	3.625

GarnetARcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.094	379.051	0.347	0.567
0.094	379.048	0.345	0.627
0.098	379.136	0.359	0.736
0.098	379.133	0.358	0.824
0.106	379.277	0.385	0.929
0.097	379.105	0.353	1.065
0.092	379.019	0.339	1.162
0.088	378.946	0.325	1.24
0.078	378.749	0.295	1.339
0.074	378.673	0.286	1.55
0.076	378.702	0.289	1.61
0.071	378.62	0.278	1.686
0.073	378.641	0.281	1.812
0.069	378.564	0.273	1.94
0.067	378.541	0.273	1.955
0.06	378.394	0.261	2.085
0.055	378.3	0.259	2.302
0.056	378.33	0.259	2.378
0.053	378.263	0.26	2.461
0.048	378.165	0.261	2.55
0.042	378.047	0.27	2.677
0.035	377.93	0.283	2.781
0.037	377.95	0.28	2.872
0.035	377.924	0.283	2.989
0.03	377.818	0.299	3.095
0.026	377.755	0.31	3.201
0.026	377.75	0.309	3.299
0.022	377.673	0.321	3.445
0.016	377.563	0.341	3.599
0.015	377.533	0.344	3.707
0.008	377.407	0.367	3.872
0.007	377.385	0.371	4.001
0.006	377.358	0.376	4.147
0.006	377.356	0.377	4.258
0.006	377.356	0.375	4.364
0.007	377.373	0.37	4.502
0.009	377.425	0.364	4.602

GarnetAScurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.035	377.92	0.285	0
0.031	377.843	0.296	0.168
0.031	377.85	0.295	0.322
0.026	377.739	0.312	0.475
0.024	377.704	0.315	0.606
0.022	377.667	0.324	0.786
0.018	377.591	0.337	0.912
0.015	377.531	0.345	1.069

0.011	377.463	0.361	1.196
0.008	377.396	0.369	1.331
0.009	377.427	0.362	1.449
0.008	377.403	0.366	1.576
0.007	377.383	0.369	1.741
0.006	377.364	0.374	1.855
0.008	377.396	0.367	1.999
0.007	377.39	0.371	2.013
0.008	377.4	0.368	2.02
0.009	377.415	0.367	2.028

GarnetAScurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.035	377.92	0.283	0
0.034	377.892	0.289	0.107
0.029	377.804	0.301	0.287
0.029	377.797	0.302	0.356
0.027	377.773	0.306	0.486
0.024	377.706	0.316	0.607
0.021	377.654	0.324	0.758
0.018	377.589	0.335	0.908
0.012	377.481	0.355	1.045
0.01	377.438	0.361	1.143
0.008	377.407	0.367	1.267
0.007	377.384	0.371	1.381
0.007	377.383	0.37	1.431

GarnetAScurve3

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.027	377.76	0.308	0.366
0.029	377.808	0.3	0.395
0.027	377.76	0.308	0.416
0.028	377.784	0.304	0.431
0.024	377.706	0.316	0.565
0.02	377.631	0.329	0.679
0.016	377.549	0.341	0.845
0.011	377.454	0.359	0.94
0.007	377.376	0.372	1.182
0.006	377.36	0.375	1.255
0.006	377.362	0.375	1.342
0.007	377.378	0.374	1.444
0.005	377.348	0.377	1.453
0.007	377.384	0.37	1.458
0.006	377.372	0.373	1.465
0.007	377.387	0.371	1.539
0.006	377.372	0.374	1.548
0.006	377.37	0.373	1.554
0.007	377.375	0.371	1.559
0.008	377.394	0.367	1.564
0.007	377.389	0.37	1.567

GarnetATcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.091	378.997	0.336	0
0.086	378.897	0.319	0.102
0.09	378.986	0.332	0.114
0.082	378.825	0.307	0.309
0.071	378.621	0.278	0.427
0.067	378.544	0.272	0.784
0.059	378.374	0.261	0.84
0.044	378.091	0.267	1.193
0.029	377.81	0.302	1.615
0.017	377.567	0.34	2.027
0.008	377.401	0.368	2.397
0.006	377.355	0.377	2.843
0.006	377.364	0.373	2.851
0.006	377.362	0.376	2.859
0.006	377.366	0.373	2.905
0.005	377.352	0.377	2.922
0.005	377.342	0.381	2.949

GarnetATcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.091	378.997	0.335	0
0.079	378.769	0.298	0.282
0.08	378.789	0.303	0.373
0.053	378.26	0.26	0.956
0.037	377.957	0.281	1.452
0.027	377.768	0.308	1.772
0.018	377.597	0.335	2.138
0.012	377.476	0.354	2.323
0.01	377.436	0.36	2.468
0.008	377.396	0.367	2.628
0.007	377.388	0.37	2.714
0.006	377.37	0.373	2.844
0.006	377.365	0.375	2.909
0.006	377.369	0.373	2.974
0.006	377.355	0.377	2.99
0.006	377.356	0.378	3.012
0.005	377.353	0.375	3.033
0.005	377.349	0.376	3.042

GarnetAUcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)

0.08	378.789	0.303	0
0.069	378.579	0.276	0.221
0.069	378.581	0.276	0.227
0.071	378.619	0.279	0.414
0.069	378.566	0.274	0.467
0.06	378.395	0.261	0.853
0.051	378.23	0.261	1.254
0.036	377.933	0.283	1.644
0.026	377.749	0.307	2.027
0.012	377.486	0.351	2.441
0.008	377.402	0.366	2.818
0.008	377.393	0.369	3.224
0.006	377.359	0.375	3.246
0.005	377.349	0.375	3.267
0.006	377.366	0.375	3.292
0.007	377.377	0.372	3.31
0.007	377.373	0.373	3.327

GarnetAUcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.08	378.789	0.301	0
0.068	378.557	0.273	0.358
0.055	378.302	0.26	0.708
0.045	378.113	0.266	1.045
0.035	377.923	0.284	1.42
0.027	377.762	0.308	1.782
0.018	377.585	0.336	2.129
0.008	377.403	0.367	2.502
0.006	377.361	0.378	2.843
0.006	377.372	0.372	2.866
0.006	377.363	0.376	2.899
0.007	377.381	0.37	2.922
0.009	377.413	0.367	2.945

GarnetAVcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.24	381.857	0.892	1.253
0.238	381.814	0.88	1.271
0.241	381.878	0.894	1.326
0.241	381.874	0.896	1.338
0.241	381.872	0.894	1.356
0.236	381.786	0.877	1.4
0.244	381.93	0.908	1.481
0.243	381.91	0.905	1.487
0.233	381.721	0.865	1.587
0.235	381.772	0.873	1.594
0.235	381.765	0.872	1.745
0.233	381.735	0.869	1.925
0.222	381.521	0.82	2.131
0.218	381.444	0.808	2.269
0.224	381.553	0.828	2.448
0.225	381.577	0.834	2.581
0.218	381.43	0.803	2.792
0.211	381.3	0.778	3.017
0.218	381.431	0.803	3.217
0.211	381.301	0.779	3.399
0.206	381.212	0.762	3.626
0.204	381.178	0.753	3.819
0.197	381.043	0.727	4.031
0.196	381.024	0.721	4.208
0.197	381.042	0.729	4.379
0.184	380.775	0.668	4.681
0.188	380.856	0.69	4.898
0.188	380.869	0.689	5.11
0.176	380.624	0.643	5.347
0.175	380.617	0.641	5.506
0.164	380.398	0.596	5.737
0.153	380.193	0.558	5.976
0.145	380.033	0.524	6.1
0.133	379.8	0.482	6.569
0.126	379.673	0.458	6.797
0.128	379.708	0.463	6.967
0.112	379.402	0.406	7.198
0.113	379.418	0.409	7.372
0.099	379.155	0.363	7.616
0.098	379.124	0.356	7.805
0.089	378.959	0.329	8.033
0.085	378.885	0.319	8.253
0.077	378.736	0.294	8.47
0.073	378.656	0.283	8.674
0.063	378.461	0.264	8.881
0.057	378.34	0.26	9.045
0.05	378.205	0.26	9.247
0.042	378.054	0.269	9.478
0.036	377.941	0.282	9.692
0.029	377.807	0.302	9.944
0.026	377.748	0.309	10.046
0.022	377.676	0.322	10.174
0.022	377.67	0.321	10.233
0.02	377.639	0.329	10.278
0.02	377.638	0.328	10.333
0.019	377.608	0.334	10.372
0.017	377.574	0.338	10.43
0.015	377.527	0.346	10.49
0.015	377.543	0.343	10.532
0.014	377.52	0.348	10.609
0.011	377.454	0.357	10.702
0.011	377.454	0.36	10.774
0.008	377.411	0.367	10.854
0.007	377.391	0.37	10.944

0.007	377.388	0.371	10.987
0.008	377.396	0.368	11.027
0.007	377.373	0.373	11.098
0.004	377.325	0.38	11.152
0.005	377.346	0.379	11.188
0.006	377.364	0.374	11.211

GarnetAVcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.259	382.224	0.969	0
0.252	382.09	0.942	0.164
0.243	381.914	0.902	0.207
0.244	381.94	0.906	0.266
0.243	381.911	0.903	0.301
0.223	381.543	0.829	0.421
0.246	381.971	0.915	0.48
0.244	381.944	0.91	0.522
0.234	381.75	0.869	0.601
0.249	382.034	0.932	0.711
0.202	381.137	0.746	0.732
0.248	382.008	0.921	0.817
0.236	381.789	0.878	0.984
0.243	381.912	0.904	1.084
0.248	382.023	0.927	1.167
0.242	381.905	0.9	1.282
0.245	381.956	0.913	1.383
0.244	381.946	0.911	1.489
0.247	382.005	0.921	1.582
0.242	381.891	0.894	1.715
0.237	381.801	0.878	1.814
0.241	381.878	0.897	1.967
0.238	381.824	0.885	2.082
0.231	381.687	0.854	2.175
0.23	381.664	0.856	2.262
0.23	381.664	0.849	2.356
0.221	381.501	0.819	2.455
0.201	381.108	0.738	2.64
0.212	381.318	0.779	2.811
0.218	381.433	0.81	2.902
0.221	381.505	0.819	3.016
0.215	381.382	0.793	3.266
0.196	381.016	0.72	3.358
0.2	381.084	0.733	3.503
0.214	381.365	0.791	3.671
0.214	381.354	0.786	3.768
0.211	381.311	0.782	3.878
0.2	381.099	0.736	3.991
0.201	381.12	0.742	4.116
0.198	381.054	0.728	4.299
0.19	380.907	0.696	4.42
0.105	379.263	0.381	5.485
0.119	379.539	0.431	5.595
0.125	379.647	0.453	5.701
0.134	379.83	0.486	5.816
0.13	379.749	0.47	5.903
0.128	379.698	0.459	5.983
0.121	379.568	0.436	6.126
0.107	379.298	0.388	6.19

GarnetAWcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.221	381.491	0.816	0
0.213	381.341	0.788	0.191
0.218	381.433	0.802	0.213
0.215	381.377	0.79	0.284
0.217	381.414	0.8	0.408
0.212	381.321	0.782	0.433
0.203	381.158	0.748	0.602
0.208	381.237	0.762	0.647
0.213	381.348	0.79	0.82
0.206	381.203	0.759	0.909
0.197	381.039	0.725	1.04
0.196	381.006	0.715	1.164
0.197	381.033	0.725	1.373
0.189	380.874	0.691	1.57
0.184	380.775	0.671	1.861
0.176	380.632	0.64	2.123
0.171	380.532	0.621	2.296
0.162	380.355	0.587	2.498
0.161	380.334	0.586	2.721
0.147	380.073	0.535	2.941
0.139	379.928	0.506	3.146
0.135	379.834	0.487	3.325
0.131	379.765	0.473	3.503
0.123	379.61	0.444	3.769
0.117	379.491	0.423	3.959
0.116	379.483	0.42	4.142
0.11	379.354	0.399	4.293
0.108	379.318	0.392	4.491
0.103	379.224	0.374	4.726
0.095	379.074	0.349	4.941
0.092	379.018	0.339	5.078
0.076	378.7	0.29	5.346
0.068	378.545	0.272	5.619
0.064	378.474	0.265	5.841
0.057	378.343	0.261	6.158
0.048	378.176	0.262	6.522
0.043	378.071	0.269	6.817
0.041	378.028	0.273	6.977
0.038	377.971	0.279	7.159

0.036	377.942	0.282	7.335
0.037	377.95	0.282	7.485
0.033	377.878	0.292	7.682
0.028	377.789	0.304	7.911
0.028	377.776	0.308	8.158
0.02	377.632	0.327	8.412
0.016	377.546	0.342	8.623
0.011	377.453	0.358	8.875
0.007	377.39	0.37	9.093
0.005	377.349	0.378	9.247
0.005	377.341	0.381	9.5

GarnetAWcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.221	381.491	0.82	0
0.213	381.347	0.787	0.214
0.217	381.413	0.799	0.335
0.221	381.486	0.82	0.5
0.209	381.271	0.773	0.684
0.204	381.159	0.748	0.83
0.212	381.328	0.783	1.046
0.199	381.07	0.731	1.216
0.189	380.886	0.698	1.431
0.187	380.842	0.685	1.675
0.18	380.714	0.661	1.843
0.177	380.646	0.647	2.064
0.175	380.614	0.64	2.214
0.162	380.359	0.59	2.411
0.158	380.289	0.573	2.543
0.155	380.222	0.56	2.696
0.138	379.899	0.498	2.873
0.144	380.009	0.522	3.1
0.135	379.848	0.489	3.304
0.132	379.781	0.478	3.515
0.118	379.517	0.429	3.727
0.114	379.448	0.414	3.921
0.105	379.269	0.382	4.145
0.098	379.129	0.358	4.394
0.092	379.023	0.341	4.574
0.087	378.914	0.323	4.805
0.073	378.651	0.282	5.092
0.067	378.531	0.271	5.311
0.056	378.325	0.26	5.557
0.048	378.165	0.263	5.74
0.04	378.018	0.273	5.983
0.036	377.937	0.284	6.309
0.029	377.801	0.303	6.529
0.026	377.747	0.31	6.708
0.018	377.601	0.333	6.91
0.015	377.535	0.345	7.13
0.009	377.429	0.364	7.323
0.007	377.386	0.37	7.499
0.006	377.37	0.373	7.661
0.008	377.397	0.368	7.852
0.009	377.416	0.364	7.92

GarnetAXcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.248	382.012	0.924	0
0.234	381.747	0.872	0.266
0.235	381.768	0.871	0.333
0.235	381.762	0.872	0.48
0.245	381.953	0.911	0.611
0.234	381.752	0.873	0.731
0.239	381.834	0.885	0.806
0.237	381.804	0.88	1.01
0.227	381.615	0.844	1.031
0.235	381.763	0.875	1.286
0.232	381.699	0.861	1.723
0.218	381.447	0.806	1.904
0.207	381.222	0.762	2.022
0.207	381.228	0.763	2.187
0.233	381.723	0.863	2.202
0.212	381.321	0.78	2.417
0.183	380.77	0.673	2.499
0.211	381.309	0.78	2.649
0.201	381.105	0.739	2.899
0.195	380.996	0.716	3.145
0.188	380.87	0.689	3.384
0.17	380.516	0.621	3.634
0.173	380.57	0.631	3.844
0.164	380.391	0.596	4.1
0.153	380.179	0.553	4.374
0.133	379.811	0.485	4.627
0.122	379.589	0.443	4.928
0.123	379.605	0.445	5.188
0.123	379.62	0.446	5.453
0.114	379.443	0.414	5.781
0.115	379.464	0.418	6.044
0.102	379.204	0.371	6.289
0.088	378.93	0.325	6.496
0.072	378.634	0.281	6.787
0.073	378.645	0.282	7.089
0.063	378.452	0.264	7.431
0.053	378.267	0.259	7.77
0.046	378.134	0.263	8.088
0.04	378.021	0.274	8.366
0.035	377.929	0.285	8.639
0.028	377.794	0.301	8.916
0.019	377.621	0.33	9.163

0.013	377.494	0.352	9.407
0.012	377.472	0.357	9.407
0.01	377.436	0.36	9.607
0.008	377.398	0.366	9.775
0.007	377.391	0.372	9.869
0.007	377.379	0.371	9.891
0.006	377.367	0.373	9.916
0.007	377.373	0.374	9.939
0.007	377.391	0.37	9.968
0.007	377.381	0.371	9.993
0.006	377.361	0.372	10.017
0.007	377.377	0.373	10.055

GarnetAXcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.226	381.584	0.834	2.809
0.212	381.318	0.785	2.882
0.171	380.543	0.624	2.882
0.194	380.968	0.711	2.927
0.222	381.508	0.825	2.954
0.211	381.312	0.78	3.017
0.226	381.585	0.841	3.154
0.221	381.503	0.821	3.349
0.222	381.506	0.816	3.562
0.208	381.243	0.765	3.833
0.207	381.233	0.763	4.163
0.214	381.363	0.787	4.401
0.207	381.218	0.761	4.624
0.202	381.136	0.745	4.935
0.197	381.036	0.727	5.213
0.188	380.86	0.688	5.474
0.176	380.635	0.642	5.751
0.133	379.81	0.483	6.428
0.12	379.558	0.434	6.713
0.107	379.304	0.39	7.076
0.085	378.881	0.318	7.463
0.03	377.822	0.302	8.244
0.023	377.684	0.319	8.455
0.016	377.556	0.342	8.922
0.005	377.351	0.377	9.413
0.006	377.372	0.373	9.525
0.006	377.365	0.374	9.544
0.007	377.389	0.37	9.575
0.006	377.372	0.374	9.609

GarnetAYcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.209	381.269	0.775	0
0.204	381.163	0.752	0.159
0.206	381.214	0.76	0.169
0.186	380.822	0.683	1.982
0.198	381.061	0.728	2.216
0.192	380.938	0.707	2.434
0.182	380.743	0.664	2.665
0.182	380.753	0.665	2.83
0.18	380.698	0.656	3.044
0.169	380.502	0.617	3.243
0.169	380.499	0.617	3.451
0.164	380.403	0.596	3.672
0.157	380.273	0.57	3.816
0.152	380.162	0.549	4.02
0.142	379.978	0.516	4.226
0.141	379.954	0.51	4.403
0.136	379.87	0.495	4.606
0.133	379.8	0.48	4.765
0.122	379.601	0.443	4.931
0.115	379.455	0.417	5.133
0.107	379.314	0.39	5.366
0.097	379.119	0.356	5.56
0.087	378.912	0.32	5.756
0.08	378.784	0.302	5.954
0.073	378.653	0.284	6.156
0.061	378.42	0.262	6.345
0.054	378.283	0.26	6.572
0.044	378.097	0.267	6.761
0.036	377.936	0.283	6.965
0.025	377.728	0.313	7.19
0.02	377.634	0.328	7.354
0.018	377.588	0.335	7.514
0.014	377.522	0.348	7.746
0.011	377.467	0.358	7.956
0.008	377.406	0.367	8.119
0.008	377.395	0.368	8.323
0.007	377.39	0.371	8.346
0.009	377.418	0.365	8.372
0.008	377.41	0.367	8.382

GarnetAYcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.186	380.831	0.684	1.955
0.191	380.918	0.701	1.963
0.193	380.957	0.708	1.965
0.181	380.731	0.661	1.969
0.192	380.945	0.707	1.983
0.192	380.946	0.708	1.996
0.193	380.965	0.713	1.999
0.196	381.018	0.72	2.053
0.195	380.992	0.716	2.152

0.19	380.895	0.694	2.204
0.185	380.796	0.675	2.253
0.187	380.845	0.684	2.302
0.186	380.828	0.684	2.351
0.176	380.636	0.642	2.401
0.183	380.758	0.667	2.471
0.179	380.697	0.654	2.568
0.174	380.6	0.639	2.666
0.172	380.558	0.63	2.759
0.167	380.448	0.606	2.849
0.164	380.405	0.598	2.912
0.152	380.168	0.549	3.037
0.153	380.195	0.554	3.11
0.153	380.188	0.556	3.223
0.146	380.051	0.528	3.346
0.146	380.061	0.532	3.421
0.14	379.931	0.506	3.523
0.13	379.755	0.474	3.626
0.123	379.607	0.445	3.759
0.12	379.557	0.435	3.817
0.114	379.445	0.416	3.917
0.106	379.277	0.383	4.021
0.098	379.13	0.36	4.125
0.093	379.038	0.341	4.239
0.084	378.869	0.315	4.35
0.077	378.73	0.293	4.469
0.072	378.622	0.278	4.573
0.063	378.452	0.264	4.701
0.053	378.271	0.259	4.866
0.05	378.201	0.261	4.988
0.048	378.177	0.262	5.097
0.046	378.13	0.264	5.193
0.04	378.009	0.275	5.329
0.031	377.839	0.297	5.559
0.026	377.754	0.309	5.672
0.023	377.693	0.318	5.767
0.019	377.607	0.333	5.865
0.015	377.527	0.348	5.915
0.01	377.436	0.36	6.125
0.008	377.406	0.368	6.219
0.006	377.369	0.374	6.323
0.008	377.393	0.369	6.341
0.006	377.366	0.375	6.349
0.007	377.387	0.37	6.366

GarnetAZcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.129	379.726	0.466	0
0.12	379.562	0.437	0.133
0.126	379.662	0.456	0.145
0.111	379.379	0.403	0.247
0.109	379.346	0.397	0.435
0.103	379.236	0.375	0.594
0.098	379.137	0.36	0.768
0.089	378.962	0.33	0.934
0.087	378.913	0.32	1.131
0.071	378.616	0.278	1.369
0.064	378.475	0.265	1.531
0.057	378.339	0.259	1.709
0.051	378.23	0.261	1.906
0.044	378.085	0.268	2.073
0.037	377.954	0.28	2.32
0.028	377.776	0.306	2.546
0.022	377.667	0.323	2.749
0.014	377.526	0.347	2.952
0.01	377.442	0.361	3.186
0.008	377.408	0.368	3.379
0.006	377.368	0.374	3.646
0.006	377.36	0.376	3.806
0.006	377.369	0.375	3.84
0.007	377.379	0.37	3.855
0.006	377.371	0.373	3.867

GarnetAZcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.129	379.726	0.466	0
0.125	379.65	0.452	0.118
0.116	379.471	0.42	0.119
0.124	379.639	0.451	0.291
0.116	379.479	0.423	0.363
0.117	379.497	0.424	0.552
0.104	379.249	0.381	0.76
0.089	378.958	0.33	1.069
0.078	378.748	0.296	1.317
0.075	378.688	0.288	1.317
0.053	378.27	0.259	1.787
0.045	378.12	0.265	2.047
0.03	377.834	0.298	2.359
0.025	377.726	0.314	2.578
0.018	377.592	0.335	2.845
0.01	377.432	0.365	3.156
0.006	377.372	0.374	3.453
0.006	377.359	0.374	3.649
0.008	377.395	0.368	3.701
0.006	377.355	0.376	3.703
0.006	377.369	0.374	3.705

GarnetAcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core

			(mm)
0.246	381.972	0.917	0.928
0.248	382.012	0.924	1.044
0.248	382.017	0.925	1.212
0.243	381.926	0.907	1.351
0.246	381.983	0.916	1.491
0.241	381.871	0.892	1.683
0.24	381.865	0.893	1.857
0.235	381.759	0.87	2.041
0.235	381.762	0.874	2.198
0.24	381.857	0.892	2.343
0.232	381.705	0.859	2.462
0.234	381.748	0.87	2.603
0.229	381.657	0.849	2.763
0.229	381.659	0.85	2.911
0.226	381.584	0.833	3.081
0.231	381.682	0.859	3.192
0.22	381.478	0.817	3.392
0.218	381.443	0.808	3.462
0.219	381.456	0.809	3.698
0.217	381.413	0.802	3.901
0.215	381.373	0.792	4.086
0.203	381.153	0.75	4.217
0.199	381.08	0.731	4.331
0.209	381.273	0.774	4.349
0.203	381.156	0.748	4.355
0.205	381.18	0.75	4.365
0.204	381.167	0.751	4.392
0.143	380.002	0.518	5.025
0.115	379.457	0.417	5.081
0.123	379.609	0.445	5.097
0.066	378.523	0.269	5.191
0.085	378.873	0.315	5.192
0.071	378.606	0.277	5.386

GarnetAcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.248	382.019	0.925	0
0.24	381.864	0.895	0.168
0.24	381.865	0.895	0.198
0.243	381.916	0.899	0.361
0.247	382	0.92	0.378
0.238	381.827	0.889	0.49
0.245	381.954	0.913	0.615
0.241	381.883	0.899	0.708
0.238	381.83	0.887	0.797
0.234	381.752	0.869	0.936
0.233	381.733	0.868	1.143
0.222	381.513	0.817	1.351
0.227	381.603	0.841	1.606
0.224	381.556	0.826	1.791
0.213	381.344	0.788	1.983
0.217	381.412	0.801	2.152
0.221	381.504	0.818	2.28
0.217	381.41	0.799	2.454
0.215	381.375	0.795	2.681
0.204	381.169	0.752	2.903
0.203	381.157	0.748	3.094
0.196	381.024	0.722	3.346
0.197	381.038	0.724	3.521
0.198	381.05	0.725	3.754
0.191	380.921	0.703	3.849
0.186	380.824	0.683	3.936
0.183	380.767	0.666	4.029
0.172	380.559	0.626	4.15
0.166	380.431	0.607	4.317
0.169	380.502	0.616	4.458
0.165	380.419	0.601	4.663
0.151	380.151	0.549	4.972
0.133	379.802	0.482	5.195
0.123	379.616	0.446	5.351
0.104	379.252	0.381	5.362
0.107	379.306	0.389	5.421
0.09	378.979	0.332	5.482
0.094	379.046	0.344	5.498
0.084	378.862	0.312	5.564
0.079	378.757	0.297	5.634
0.069	378.574	0.274	5.704
0.055	378.297	0.26	5.966
0.048	378.164	0.263	6.065
0.042	378.057	0.271	6.147
0.029	377.814	0.3	6.302
0.025	377.725	0.313	6.391
0.017	377.572	0.338	6.59
0.017	377.575	0.338	6.734
0.014	377.518	0.348	6.918
0.012	377.475	0.355	7.078
0.008	377.405	0.365	7.21
0.006	377.362	0.374	7.481

GarnetBAcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.211	381.306	0.778	2.757
0.212	381.324	0.786	2.76
0.21	381.288	0.774	2.807
0.214	381.363	0.791	2.922
0.21	381.285	0.779	3.063
0.204	381.178	0.75	3.272
0.207	381.227	0.763	3.482
0.2	381.09	0.736	3.747

0.195	380.992	0.714	4.015
0.18	380.711	0.661	4.4
0.173	380.579	0.633	4.689
0.16	380.319	0.583	5.015
0.159	380.312	0.577	5.323
0.15	380.131	0.546	5.665
0.145	380.039	0.525	5.994
0.132	379.79	0.481	6.374
0.127	379.695	0.46	6.703
0.112	379.41	0.405	7.14
0.094	379.049	0.343	7.463
0.082	378.821	0.307	7.899
0.06	378.401	0.261	8.241
0.054	378.286	0.259	8.583
0.039	378.004	0.274	8.986
0.031	377.844	0.295	9.342
0.021	377.66	0.323	9.747
0.012	377.48	0.356	10.086
0.006	377.355	0.378	10.525
0.005	377.338	0.38	10.883
0.005	377.336	0.379	10.898
0.005	377.346	0.378	10.971
0.005	377.345	0.379	10.98
0.006	377.361	0.374	10.99

GarnetBAcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.234	381.746	0.868	0
0.228	381.637	0.846	0.282
0.224	381.55	0.83	0.34
0.231	381.686	0.857	0.587
0.232	381.701	0.855	0.656
0.234	381.743	0.87	0.926
0.227	381.619	0.844	0.968
0.224	381.55	0.829	1.215
0.227	381.61	0.84	1.37
0.233	381.73	0.866	1.436
0.228	381.631	0.843	1.634
0.227	381.606	0.845	1.643
0.221	381.498	0.817	1.92
0.218	381.437	0.805	2.199
0.21	381.288	0.776	2.222
0.202	381.131	0.745	2.414
0.217	381.412	0.8	2.524
0.21	381.292	0.772	2.723
0.21	381.28	0.772	2.743
0.208	381.242	0.766	2.859
0.203	381.14	0.745	2.965
0.101	379.198	0.37	3.821
0.118	379.512	0.428	4.192
0.112	379.397	0.406	4.433
0.052	378.242	0.26	4.673
0.008	377.408	0.367	5.439
0.006	377.356	0.376	5.616
0.005	377.352	0.376	5.73
0.007	377.386	0.372	5.806
0.009	377.412	0.366	5.865
0.007	377.378	0.372	5.891
0.009	377.421	0.366	5.894
0.008	377.405	0.368	5.908
0.008	377.395	0.369	5.949

GarnetBBcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.059	378.381	0.26	0
0.051	378.221	0.261	0.128
0.059	378.374	0.261	0.2
0.054	378.284	0.259	0.432
0.043	378.084	0.269	0.651
0.043	378.065	0.269	0.927
0.045	378.11	0.267	1.135
0.044	378.096	0.267	1.345
0.037	377.967	0.279	1.569
0.025	377.724	0.314	1.69
0.019	377.608	0.333	2.008
0.012	377.475	0.354	2.202
0.009	377.418	0.366	2.408
0.009	377.422	0.363	2.464
0.007	377.388	0.37	2.586
0.007	377.378	0.371	2.631
0.007	377.378	0.369	2.692
0.006	377.369	0.374	2.733

GarnetBBcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.058	378.369	0.261	0.428
0.053	378.272	0.26	0.453
0.058	378.364	0.259	0.525
0.045	378.113	0.266	0.624
0.051	378.236	0.26	1.187
0.019	377.613	0.332	1.621
0.008	377.41	0.368	1.94
0.007	377.383	0.369	2.185
0.006	377.361	0.376	2.426
0.007	377.373	0.373	2.596
0.006	377.37	0.372	2.791
0.006	377.369	0.375	2.893

GarnetBCcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.05	378.211	0.262	0
0.049	378.188	0.261	0.11
0.049	378.193	0.262	0.116
0.047	378.147	0.264	0.209
0.044	378.096	0.266	0.313
0.042	378.061	0.27	0.461
0.045	378.118	0.264	0.543
0.047	378.146	0.263	0.646
0.043	378.069	0.267	0.744
0.039	377.989	0.277	0.856
0.03	377.832	0.298	1.022
0.025	377.719	0.314	1.142
0.021	377.654	0.324	1.362
0.015	377.536	0.345	1.549
0.013	377.498	0.353	1.725
0.012	377.477	0.355	1.881
0.009	377.421	0.365	1.999
0.007	377.377	0.371	2.149
0.007	377.378	0.373	2.249
0.006	377.362	0.375	2.409
0.007	377.374	0.372	2.549
0.008	377.402	0.366	2.726
0.007	377.381	0.369	2.739
0.006	377.371	0.375	2.757
0.007	377.39	0.37	2.763

GarnetBCcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.05	378.211	0.26	0
0.049	378.187	0.261	0.058
0.046	378.139	0.263	0.098
0.045	378.112	0.265	0.269
0.045	378.115	0.266	0.394
0.044	378.102	0.266	0.524
0.04	378.025	0.274	0.7
0.037	377.965	0.28	0.89
0.029	377.802	0.302	1.071
0.017	377.566	0.339	1.315
0.011	377.463	0.358	1.49
0.009	377.419	0.365	1.687
0.008	377.395	0.371	1.873

GarnetBDcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.231	381.691	0.855	0
0.221	381.498	0.816	0.189
0.219	381.466	0.808	0.228
0.221	381.493	0.815	0.395
0.214	381.352	0.789	0.484
0.22	381.473	0.813	0.539
0.209	381.268	0.77	0.604
0.207	381.228	0.761	0.763
0.23	381.676	0.856	0.8
0.221	381.489	0.815	0.928
0.205	381.191	0.753	1.02
0.224	381.552	0.827	1.126
0.208	381.252	0.765	1.227
0.189	380.873	0.694	1.471
0.181	380.724	0.663	1.644
0.182	380.754	0.664	1.834
0.181	380.718	0.659	2.022
0.168	380.469	0.612	2.236
0.163	380.377	0.593	2.531
0.153	380.193	0.557	2.693
0.152	380.16	0.549	2.874
0.144	380.024	0.52	3.089
0.133	379.811	0.485	3.317
0.131	379.773	0.476	3.515
0.121	379.575	0.438	3.717
0.114	379.43	0.413	3.928
0.104	379.253	0.38	4.115
0.1	379.167	0.366	4.258
0.096	379.098	0.354	4.499
0.089	378.959	0.329	4.695
0.082	378.831	0.308	4.88
0.071	378.61	0.278	5.04
0.062	378.44	0.264	5.235
0.053	378.27	0.259	5.436
0.047	378.148	0.262	5.617
0.043	378.079	0.269	5.85
0.039	378	0.276	6.048
0.034	377.905	0.287	6.224
0.026	377.747	0.31	6.447
0.021	377.653	0.324	6.606
0.016	377.564	0.339	6.819
0.013	377.5	0.352	7.011
0.01	377.449	0.362	7.254
0.007	377.388	0.371	7.462
0.007	377.378	0.372	7.623
0.005	377.349	0.378	7.834
0.006	377.361	0.376	7.892
0.005	377.35	0.376	7.907
0.008	377.398	0.368	7.921
0.006	377.372	0.372	7.929
0.007	377.38	0.371	7.943
0.007	377.38	0.372	7.948

GarnetBDcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.225	381.568	0.832	1.034
0.216	381.4	0.8	1.066
0.187	380.849	0.685	1.165
0.19	380.894	0.696	1.281
0.196	381.007	0.719	1.318
0.226	381.589	0.84	1.537
0.215	381.388	0.798	1.697
0.209	381.26	0.771	1.878
0.213	381.348	0.786	2.105
0.214	381.362	0.79	2.282
0.21	381.276	0.779	2.469
0.211	381.301	0.778	2.669
0.208	381.254	0.773	2.858
0.203	381.144	0.747	3.041
0.203	381.158	0.748	3.232
0.202	381.133	0.744	3.453
0.197	381.041	0.727	3.656
0.197	381.033	0.724	3.853
0.188	380.863	0.688	4.038
0.182	380.745	0.662	4.39
0.174	380.594	0.636	4.655
0.169	380.498	0.614	4.868
0.166	380.446	0.604	5.049
0.161	380.341	0.587	5.2
0.164	380.394	0.594	5.398
0.154	380.209	0.563	5.611
0.146	380.063	0.533	5.836
0.139	379.919	0.504	6.008
0.138	379.894	0.499	6.222
0.138	379.907	0.5	6.367
0.128	379.699	0.461	6.528
0.115	379.459	0.416	6.734
0.087	378.912	0.321	6.902
0.071	378.61	0.278	7.097
0.07	378.591	0.276	7.34
0.074	378.664	0.284	7.538
0.064	378.475	0.266	7.75
0.056	378.329	0.259	7.932
0.05	378.208	0.261	8.134
0.041	378.04	0.272	8.365
0.033	377.89	0.29	8.593
0.022	377.664	0.322	8.777
0.011	377.465	0.358	9.015
0.008	377.403	0.367	9.118
0.007	377.382	0.371	9.22
0.008	377.394	0.368	9.253
0.009	377.416	0.364	9.281
0.008	377.407	0.365	9.284

GarnetBEcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.184	380.779	0.676	0
0.173	380.582	0.633	0.198
0.18	380.715	0.66	0.204
0.18	380.713	0.659	0.444
0.177	380.652	0.647	0.633
0.172	380.545	0.627	0.903
0.167	380.451	0.607	1.019
0.166	380.44	0.608	1.191
0.159	380.313	0.581	1.383
0.152	380.164	0.552	1.612
0.146	380.061	0.531	1.818
0.141	379.954	0.509	2.012
0.135	379.835	0.487	2.172
0.125	379.658	0.452	2.392
0.115	379.459	0.416	2.594
0.109	379.345	0.396	2.768
0.092	379.024	0.341	3.02
0.082	378.83	0.308	3.194
0.071	378.619	0.278	3.386
0.058	378.357	0.26	3.58
0.049	378.197	0.26	3.786
0.037	377.963	0.278	4.017
0.031	377.835	0.297	4.184
0.024	377.713	0.316	4.388
0.014	377.512	0.351	4.606
0.014	377.509	0.349	4.629
0.012	377.482	0.352	4.686
0.013	377.489	0.354	4.763
0.011	377.468	0.356	4.816
0.011	377.467	0.356	4.824
0.012	377.472	0.356	4.829
0.012	377.473	0.356	4.831

GarnetBEcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.17	380.512	0.622	1.073
0.169	380.501	0.615	1.077
0.163	380.389	0.594	1.106
0.161	380.338	0.588	1.121
0.16	380.315	0.583	1.168
0.163	380.385	0.593	1.187
0.156	380.253	0.572	1.248
0.143	379.992	0.515	1.379
0.141	379.956	0.511	1.532

0.142	379.981	0.514	1.69
0.127	379.682	0.46	1.821
0.116	379.473	0.42	2.002
0.115	379.461	0.421	2.09
0.096	379.089	0.351	2.345
0.092	379.011	0.34	2.517
0.078	378.744	0.297	2.692
0.072	378.626	0.281	2.88
0.062	378.443	0.263	3.062
0.052	378.241	0.26	3.254
0.045	378.108	0.267	3.451
0.037	377.962	0.28	3.645
0.032	377.87	0.292	3.829
0.025	377.721	0.314	4.033
0.021	377.659	0.324	4.163
0.02	377.629	0.328	4.22
0.018	377.602	0.332	4.251
0.019	377.607	0.333	4.269

GarnetBFcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.202	381.139	0.745	0.843
0.207	381.217	0.762	0.856
0.208	381.241	0.768	0.858
0.207	381.22	0.762	0.915
0.203	381.149	0.744	0.96
0.203	381.156	0.75	1.044
0.198	381.061	0.727	1.058
0.204	381.17	0.747	1.103
0.206	381.201	0.76	1.24
0.195	380.99	0.714	1.319
0.199	381.08	0.732	1.412
0.203	381.14	0.747	1.512
0.192	380.946	0.706	1.65
0.198	381.053	0.727	1.698
0.186	380.815	0.681	1.702
0.209	381.268	0.772	1.727
0.192	380.941	0.705	2.04
0.194	380.981	0.713	2.185
0.194	380.977	0.709	2.344
0.189	380.885	0.695	2.529
0.19	380.891	0.697	2.633
0.191	380.923	0.7	2.765
0.194	380.969	0.713	2.894
0.187	380.847	0.687	3.026
0.181	380.726	0.662	3.144
0.175	380.619	0.641	3.341
0.168	380.484	0.615	3.544
0.165	380.425	0.603	3.733
0.155	380.236	0.565	3.886
0.134	379.831	0.486	4.063
0.123	379.618	0.446	4.242
0.103	379.22	0.372	4.374
0.099	379.143	0.361	4.542
0.074	378.666	0.285	4.768
0.071	378.621	0.279	4.886
0.059	378.374	0.262	5.004
0.042	378.062	0.269	5.276
0.036	377.936	0.282	5.42
0.032	377.86	0.291	5.561
0.026	377.752	0.309	5.678
0.019	377.607	0.334	5.843

GarnetBFcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.221	381.493	0.816	0
0.212	381.33	0.785	0.292
0.212	381.325	0.784	0.585
0.217	381.41	0.8	0.824
0.216	381.396	0.797	1.052
0.207	381.233	0.765	1.351
0.21	381.275	0.772	1.523
0.205	381.184	0.756	1.708
0.203	381.146	0.745	1.927
0.179	380.684	0.654	2.128
0.143	379.988	0.519	2.853
0.176	380.638	0.647	3.268
0.17	380.514	0.62	3.537
0.159	380.307	0.58	3.784
0.139	379.929	0.505	4.028
0.13	379.746	0.472	4.223
0.141	379.952	0.51	4.434
0.131	379.758	0.474	4.639
0.133	379.805	0.481	4.849
0.126	379.671	0.457	5.205
0.123	379.614	0.448	5.383
0.097	379.113	0.355	5.801
0.101	379.182	0.365	6.092
0.091	379.003	0.336	6.381
0.085	378.878	0.317	6.627
0.072	378.635	0.28	6.892
0.062	378.435	0.264	7.094
0.055	378.302	0.261	7.377
0.047	378.145	0.263	7.626
0.047	378.149	0.263	7.813
0.039	378.003	0.275	8.099
0.033	377.888	0.289	8.331
0.027	377.759	0.31	8.597
0.018	377.593	0.335	8.898
0.016	377.559	0.342	9.026

0.013	377.493	0.353	9.12
0.011	377.468	0.356	9.262
0.01	377.442	0.361	9.3
0.011	377.462	0.357	9.314
0.01	377.434	0.363	9.329
0.01	377.443	0.362	9.33
0.009	377.413	0.366	9.369
0.007	377.387	0.37	9.519
0.007	377.387	0.37	9.543

GarnetBGcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.197	381.035	0.725	0
0.195	380.986	0.718	0.292
0.192	380.93	0.703	0.579
0.187	380.841	0.688	0.816
0.176	380.623	0.64	1.09
0.177	380.647	0.647	1.359
0.168	380.471	0.609	1.625
0.157	380.266	0.572	1.878
0.153	380.185	0.553	2.156
0.136	379.852	0.492	2.423
0.114	379.439	0.413	2.73
0.103	379.225	0.375	3.006
0.082	378.823	0.307	3.296
0.072	378.627	0.28	3.512
0.054	378.289	0.26	3.838
0.041	378.044	0.271	4.112
0.032	377.869	0.292	4.433
0.021	377.649	0.325	4.707
0.013	377.496	0.351	4.919
0.006	377.36	0.376	5.198
0.007	377.391	0.37	5.271
0.007	377.378	0.37	5.294

GarnetBGcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.191	380.91	0.703	0.507
0.191	380.916	0.707	0.579
0.192	380.935	0.703	0.824
0.176	380.631	0.645	1.073
0.173	380.571	0.632	1.405
0.077	378.721	0.293	2.7
0.142	379.978	0.513	2.962
0.145	380.035	0.526	3.181
0.136	379.869	0.493	3.405
0.107	379.295	0.387	3.691
0.09	378.973	0.332	4.043
0.064	378.483	0.266	4.239
0.034	377.906	0.285	4.963
0.042	378.052	0.27	5.194
0.04	378.021	0.275	5.529
0.037	377.963	0.28	5.818
0.033	377.886	0.289	6.124
0.031	377.849	0.294	6.463
0.024	377.704	0.319	6.772
0.021	377.642	0.327	7.065
0.012	377.486	0.353	7.339
0.009	377.415	0.365	7.515
0.01	377.449	0.359	7.54
0.01	377.449	0.36	7.557
0.008	377.41	0.368	7.616
0.01	377.433	0.363	7.624
0.01	377.434	0.363	7.628

GarnetBHcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.141	379.954	0.509	0
0.138	379.907	0.503	0.154
0.137	379.874	0.495	0.305
0.139	379.925	0.505	0.498
0.136	379.858	0.494	0.729
0.138	379.897	0.501	0.913
0.13	379.745	0.472	1.14
0.123	379.612	0.444	1.365
0.114	379.44	0.413	1.592
0.104	379.239	0.377	1.808
0.094	379.054	0.346	2.021
0.08	378.782	0.3	2.252
0.071	378.621	0.279	2.419
0.058	378.364	0.259	2.721
0.047	378.15	0.263	2.982
0.037	377.959	0.279	3.226
0.032	377.862	0.292	3.437
0.026	377.744	0.31	3.669
0.023	377.683	0.32	3.782
0.02	377.639	0.328	3.987
0.016	377.549	0.341	4.167
0.012	377.48	0.354	4.398
0.008	377.41	0.366	4.583
0.008	377.393	0.369	4.742
0.005	377.346	0.378	4.952
0.005	377.353	0.377	4.984
0.004	377.327	0.381	5.051
0.005	377.353	0.377	5.087
0.005	377.348	0.377	5.112

GarnetBHcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.103	379.232	0.376	1.334
0.105	379.262	0.385	1.359
0.119	379.541	0.434	1.384
0.121	379.57	0.438	1.418
0.119	379.538	0.429	1.502
0.124	379.628	0.451	1.587
0.102	379.216	0.373	1.716
0.077	378.736	0.293	1.865
0.045	378.115	0.264	1.945
0.039	378.003	0.275	2.146
0.037	377.959	0.28	2.24
0.029	377.806	0.299	2.315
0.024	377.712	0.315	2.349
0.015	377.533	0.345	2.394
0.01	377.431	0.363	2.48
0.007	377.387	0.371	2.567
0.029	377.8	0.301	2.64
0.018	377.598	0.333	2.919

GarnetBIcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.058	378.358	0.26	0
0.052	378.245	0.26	0.152
0.056	378.316	0.26	0.211
0.044	378.102	0.267	0.266
0.051	378.237	0.259	0.512
0.051	378.232	0.259	0.672
0.044	378.098	0.267	0.915
0.039	377.992	0.276	1.064
0.033	377.884	0.289	1.215
0.026	377.752	0.309	1.381
0.018	377.6	0.335	1.687
0.011	377.454	0.36	1.981
0.007	377.379	0.372	2.27
0.006	377.362	0.373	2.438
0.006	377.366	0.375	2.485
0.007	377.38	0.37	2.572
0.006	377.371	0.372	2.629
0.007	377.38	0.372	2.675

GarnetBIcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.058	378.358	0.261	0
0.056	378.333	0.26	0.18
0.047	378.158	0.262	0.358
0.045	378.104	0.266	0.512
0.034	377.896	0.288	0.709
0.03	377.829	0.298	0.897
0.029	377.806	0.301	1.075
0.025	377.736	0.31	1.244
0.016	377.556	0.34	1.535
0.01	377.441	0.36	1.739
0.008	377.401	0.367	1.975
0.007	377.373	0.373	2.159
0.005	377.349	0.377	2.31
0.004	377.331	0.38	2.419
0.007	377.384	0.369	2.441

GarnetBJcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.217	381.422	0.801	0
0.213	381.338	0.782	0.156
0.204	381.175	0.755	0.159
0.208	381.254	0.772	0.192
0.196	381.023	0.721	0.36
0.213	381.335	0.781	0.383
0.203	381.148	0.746	0.493
0.206	381.213	0.763	0.619
0.202	381.131	0.742	0.7
0.201	381.117	0.741	0.781
0.198	381.05	0.727	0.876
0.2	381.091	0.736	0.985
0.191	380.921	0.698	1.131
0.193	380.95	0.708	1.257
0.193	380.963	0.709	1.465
0.189	380.873	0.69	1.612
0.187	380.837	0.684	1.77
0.179	380.689	0.653	1.893
0.167	380.452	0.603	2.072
0.17	380.511	0.617	2.258
0.164	380.399	0.597	2.411
0.16	380.316	0.581	2.725
0.151	380.144	0.544	2.909
0.153	380.196	0.556	3.056
0.147	380.076	0.533	3.206
0.139	379.92	0.503	3.326
0.129	379.724	0.466	3.552
0.131	379.769	0.474	3.746
0.118	379.519	0.428	3.982
0.105	379.263	0.382	4.188
0.1	379.168	0.364	4.399
0.097	379.108	0.355	4.561
0.075	378.685	0.287	4.693
0.077	378.726	0.294	4.847
0.072	378.624	0.28	5.006

0.071	378.604	0.278	5.16
0.065	378.495	0.266	5.323
0.061	378.423	0.262	5.451
0.053	378.273	0.259	5.589
0.046	378.137	0.263	5.821
0.039	377.991	0.277	5.909
0.031	377.838	0.296	6.1
0.029	377.811	0.299	6.265
0.025	377.726	0.313	6.451
0.021	377.652	0.323	6.582
0.02	377.638	0.328	6.688
0.018	377.584	0.335	6.759
0.014	377.515	0.348	6.887
0.011	377.464	0.356	7.024
0.009	377.417	0.364	7.124
0.005	377.344	0.377	7.298
0.005	377.346	0.376	7.464
0.005	377.348	0.376	7.585
0.005	377.353	0.376	7.669
0.007	377.376	0.373	7.692
0.007	377.374	0.373	7.709
0.006	377.369	0.374	7.716

GarnetBJcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.217	381.422	0.804	0
0.216	381.391	0.797	0.179
0.215	381.378	0.795	0.194
0.21	381.277	0.771	0.194
0.204	381.169	0.749	0.252
0.208	381.248	0.766	0.255
0.207	381.229	0.764	0.327
0.211	381.312	0.781	0.359
0.194	380.977	0.709	0.403
0.188	380.858	0.687	0.522
0.18	380.716	0.662	0.65
0.19	380.893	0.695	0.758
0.163	380.388	0.593	0.944
0.171	380.535	0.623	1.168
0.162	380.365	0.589	1.352
0.178	380.678	0.655	1.484
0.163	380.389	0.596	1.584
0.147	380.076	0.531	1.912
0.138	379.909	0.499	2.006
0.098	379.129	0.358	2.345
0.095	379.082	0.352	2.511
0.087	378.926	0.323	2.809
0.085	378.885	0.317	3.052
0.078	378.751	0.296	3.2
0.076	378.706	0.289	3.472
0.071	378.606	0.278	3.687
0.064	378.476	0.265	3.844
0.06	378.394	0.261	3.98
0.051	378.232	0.26	4.113
0.046	378.141	0.263	4.291
0.04	378.014	0.274	4.435
0.034	377.903	0.287	4.627
0.031	377.837	0.297	4.771
0.025	377.737	0.31	5.001
0.021	377.659	0.326	5.137
0.013	377.506	0.351	5.303
0.008	377.405	0.368	5.446
0.007	377.383	0.371	5.581
0.006	377.367	0.374	5.627
0.006	377.359	0.375	5.659
0.006	377.371	0.373	5.665
0.006	377.368	0.375	5.708
0.008	377.394	0.37	5.727

GarnetBK1curve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.029	377.81	0.3	1.571
0.027	377.776	0.303	1.636
0.023	377.691	0.319	1.767
0.018	377.599	0.335	1.897
0.017	377.569	0.339	1.976
0.012	377.478	0.353	2.071
0.01	377.433	0.362	2.203
0.005	377.343	0.378	2.228
0.006	377.364	0.375	2.308

GarnetBK1curve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.016	377.559	0.34	1.092
0.018	377.599	0.334	1.106
0.019	377.603	0.333	1.169
0.012	377.486	0.352	1.225
0.011	377.453	0.358	1.238
0.011	377.46	0.358	1.269
0.012	377.471	0.355	1.281
0.009	377.426	0.363	1.287
0.01	377.445	0.36	1.309
0.027	377.764	0.308	1.334
0.029	377.807	0.299	1.386
0.029	377.8	0.304	1.44
0.03	377.822	0.298	1.504

GarnetBK1curve3

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.051	378.237	0.26	0
0.049	378.195	0.262	0.093
0.047	378.156	0.263	0.233
0.038	377.986	0.277	0.326
0.026	377.749	0.311	0.476
0.023	377.698	0.318	0.603
0.018	377.598	0.333	0.727
0.012	377.473	0.354	0.818
0.012	377.472	0.356	0.975
0.013	377.489	0.353	1.079
0.013	377.499	0.352	1.241
0.01	377.449	0.36	1.357
0.009	377.422	0.365	1.678
0.007	377.377	0.375	1.796
0.007	377.381	0.373	1.881
0.006	377.365	0.375	1.985
0.006	377.365	0.376	2.163
0.006	377.365	0.375	2.242
0.005	377.34	0.377	2.343
0.005	377.352	0.377	2.391
0.005	377.348	0.377	2.414
0.006	377.366	0.374	2.436

GarnetBK3curve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.04	378.023	0.272	0
0.036	377.941	0.282	0.123
0.04	378.013	0.275	0.181
0.036	377.937	0.283	0.261
0.032	377.862	0.294	0.354
0.03	377.818	0.3	0.505
0.022	377.668	0.322	0.729
0.017	377.574	0.337	0.858
0.012	377.483	0.355	1.041
0.009	377.422	0.364	1.212
0.008	377.4	0.369	1.345
0.006	377.366	0.374	1.475
0.006	377.37	0.374	1.598
0.006	377.362	0.374	1.625

GarnetBK3curve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.035	377.918	0.285	0.508
0.033	377.88	0.291	0.516
0.035	377.914	0.286	0.545
0.03	377.824	0.297	0.615
0.027	377.766	0.306	0.788
0.021	377.656	0.323	0.869
0.012	377.487	0.351	1.008
0.011	377.453	0.36	1.096
0.009	377.411	0.368	1.148
0.007	377.384	0.371	1.211
0.006	377.355	0.376	1.316
0.006	377.367	0.373	1.445
0.006	377.361	0.374	1.585
0.004	377.332	0.379	1.712
0.006	377.37	0.372	1.799
0.007	377.378	0.371	1.871
0.007	377.389	0.369	1.876

GarnetBLcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.246	381.969	0.916	0
0.226	381.582	0.835	0.465
0.231	381.693	0.858	0.497
0.232	381.703	0.86	0.615
0.244	381.928	0.909	0.643
0.238	381.826	0.889	0.865
0.23	381.674	0.855	0.883
0.207	381.227	0.761	1.049
0.216	381.405	0.8	1.087
0.175	380.604	0.636	1.321
0.173	380.571	0.631	1.621
0.166	380.441	0.608	1.839
0.167	380.466	0.611	2.068
0.186	380.816	0.678	2.287
0.204	381.168	0.751	2.415
0.197	381.038	0.723	2.643
0.206	381.207	0.76	2.856
0.183	380.764	0.671	3.215
0.182	380.747	0.671	3.507
0.176	380.638	0.646	3.762
0.152	380.174	0.552	4.106
0.144	380.008	0.522	4.358
0.136	379.854	0.492	4.546
0.112	379.406	0.407	4.918
0.069	378.583	0.275	5.549
0.06	378.404	0.262	5.801
0.048	378.166	0.262	6.189
0.034	377.901	0.288	6.579
0.025	377.734	0.312	6.812
0.021	377.657	0.324	6.961
0.014	377.51	0.35	7.15
0.01	377.439	0.362	7.261
0.009	377.419	0.365	7.307

0.007	377.39	0.372	7.377
0.008	377.392	0.369	7.391
0.007	377.377	0.375	7.434
0.005	377.353	0.376	7.459
0.007	377.379	0.37	7.47

GarnetBLcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.246	381.969	0.918	0
0.234	381.739	0.867	0.146
0.234	381.751	0.868	0.362
0.229	381.658	0.853	0.562
0.218	381.438	0.808	0.748
0.237	381.8	0.879	0.981
0.225	381.572	0.831	1.157
0.232	381.712	0.863	1.365
0.234	381.746	0.869	1.583
0.231	381.695	0.855	1.764
0.21	381.283	0.771	1.969
0.216	381.39	0.795	2.223
0.222	381.506	0.817	2.361
0.215	381.379	0.793	2.547
0.206	381.21	0.76	2.77
0.207	381.23	0.767	2.951
0.196	381.013	0.721	3.194
0.2	381.085	0.733	3.36
0.198	381.054	0.73	3.762
0.197	381.028	0.724	3.974
0.202	381.121	0.745	4.164
0.175	380.608	0.636	4.345
0.167	380.455	0.607	4.531
0.158	380.287	0.577	4.741
0.134	379.829	0.486	5.157
0.13	379.756	0.472	5.539
0.144	380.021	0.522	5.806
0.152	380.161	0.548	5.96
0.148	380.092	0.537	6.139
0.144	380.006	0.52	6.353
0.147	380.076	0.534	6.573
0.128	379.709	0.463	6.772
0.117	379.495	0.424	6.985
0.108	379.325	0.392	7.186
0.096	379.089	0.351	7.351
0.084	378.857	0.311	7.579
0.071	378.617	0.279	7.768
0.056	378.327	0.26	7.925
0.032	377.869	0.292	8.149
0.028	377.785	0.303	8.407
0.024	377.707	0.315	8.58
0.022	377.662	0.323	8.634
0.019	377.614	0.331	8.666
0.018	377.603	0.333	8.684
0.016	377.565	0.34	8.733
0.015	377.545	0.343	8.742

GarnetBMcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.18	380.712	0.66	0
0.18	380.707	0.661	0.306
0.172	380.548	0.622	0.593
0.172	380.563	0.631	0.9
0.166	380.437	0.604	1.191
0.159	380.299	0.579	1.48
0.147	380.081	0.535	1.805
0.137	379.875	0.494	2.089
0.126	379.663	0.454	2.428
0.103	379.221	0.372	2.88
0.092	379.017	0.338	3.185
0.08	378.795	0.303	3.476
0.065	378.489	0.267	3.782
0.052	378.243	0.26	4.061
0.037	377.963	0.278	4.378
0.03	377.821	0.298	4.638
0.018	377.595	0.334	4.989
0.013	377.493	0.352	5.253
0.006	377.365	0.373	5.578
0.006	377.358	0.376	5.799
0.006	377.366	0.373	5.855
0.007	377.378	0.372	5.879
0.008	377.393	0.369	5.893
0.007	377.375	0.374	5.904
0.007	377.374	0.374	5.914

GarnetBMcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.18	380.712	0.657	0
0.179	380.68	0.653	0.523
0.171	380.534	0.626	0.632
0.157	380.266	0.569	1.029
0.137	379.883	0.496	1.466
0.125	379.648	0.451	1.882
0.108	379.317	0.391	2.278
0.045	378.121	0.264	2.643
0.028	377.786	0.303	3.06
0.055	378.314	0.26	3.466
0.105	379.257	0.38	3.957
0.099	379.159	0.366	4.455
0.106	379.281	0.386	4.9

0.101	379.198	0.372	5.311
0.101	379.183	0.37	5.677
0.098	379.138	0.36	6.152
0.089	378.961	0.328	6.9
0.104	379.247	0.38	7.255
0.1	379.172	0.366	7.642
0.087	378.911	0.322	8.088
0.05	378.217	0.261	8.478
0.044	378.086	0.267	8.55
0.04	378.009	0.276	8.608
0.036	377.946	0.282	8.647
0.036	377.949	0.282	8.676

GarnetBNcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.239	381.833	0.89	0
0.233	381.728	0.864	0.162
0.238	381.829	0.885	0.341
0.238	381.829	0.888	0.462
0.237	381.805	0.883	0.586
0.236	381.778	0.876	0.776
0.236	381.793	0.881	0.898
0.236	381.785	0.877	1.066
0.233	381.719	0.863	1.205
0.235	381.757	0.873	1.36
0.234	381.738	0.871	1.511
0.231	381.69	0.856	1.675
0.229	381.657	0.852	1.809
0.222	381.521	0.825	1.97
0.228	381.623	0.843	2.105
0.222	381.512	0.821	2.266
0.226	381.584	0.836	2.438
0.213	381.338	0.785	2.588
0.218	381.445	0.806	2.715
0.212	381.327	0.785	2.867
0.212	381.318	0.783	3.012
0.205	381.183	0.753	3.169
0.206	381.199	0.755	3.308
0.203	381.145	0.747	3.468
0.2	381.083	0.731	3.624
0.193	380.956	0.705	3.769
0.187	380.833	0.682	3.931
0.182	380.748	0.666	4.168
0.174	380.591	0.633	4.321
0.174	380.588	0.635	4.472
0.17	380.509	0.62	4.633
0.172	380.556	0.629	4.769
0.163	380.389	0.592	4.923
0.158	380.288	0.574	5.107
0.147	380.065	0.532	5.252
0.142	379.97	0.513	5.382
0.138	379.893	0.499	5.513
0.136	379.86	0.49	5.686
0.13	379.751	0.469	5.817
0.122	379.599	0.443	5.956
0.118	379.512	0.426	6.136
0.11	379.361	0.401	6.276
0.104	379.247	0.378	6.428
0.095	379.081	0.352	6.562
0.092	379.014	0.339	6.647
0.091	378.99	0.336	6.716
0.083	378.849	0.311	6.806
0.081	378.808	0.306	6.834
0.07	378.598	0.277	6.886

GarnetBNcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.224	381.55	0.83	0.885
0.228	381.634	0.845	0.894
0.233	381.722	0.866	0.912
0.227	381.613	0.839	0.952
0.223	381.541	0.83	0.965
0.218	381.442	0.806	1.053
0.223	381.527	0.827	1.112
0.222	381.513	0.824	1.199
0.225	381.564	0.831	1.333
0.22	381.472	0.811	1.475
0.219	381.452	0.808	1.641
0.215	381.381	0.796	1.829
0.218	381.442	0.808	1.967
0.216	381.39	0.795	2.184
0.213	381.343	0.789	2.373
0.206	381.212	0.76	2.559
0.206	381.201	0.756	2.715
0.207	381.223	0.765	2.928
0.21	381.288	0.774	3.103
0.199	381.077	0.727	3.299
0.202	381.139	0.744	3.498
0.199	381.069	0.732	3.698
0.187	380.841	0.685	3.904
0.186	380.817	0.681	4.077
0.171	380.526	0.623	4.328
0.149	380.104	0.541	4.915
0.155	380.232	0.565	5.081
0.158	380.277	0.576	5.254
0.16	380.318	0.579	5.502
0.146	380.063	0.529	5.718
0.147	380.074	0.536	5.835
0.147	380.071	0.531	6.038
0.133	379.81	0.482	6.261

0.127	379.691	0.46	6.434
0.123	379.614	0.447	6.659
0.119	379.537	0.433	6.902
0.111	379.377	0.402	7.069
0.099	379.157	0.364	7.275
0.089	378.96	0.33	7.453
0.08	378.781	0.301	7.623
0.066	378.512	0.27	7.884
0.056	378.333	0.261	8.054
0.043	378.076	0.269	8.259
0.032	377.863	0.294	8.478
0.026	377.739	0.312	8.684
0.022	377.661	0.323	8.892
0.014	377.519	0.347	9.068
0.008	377.408	0.368	9.235
0.005	377.348	0.38	9.447
0.006	377.359	0.375	9.49
0.006	377.361	0.375	9.518
0.005	377.342	0.378	9.533

GarnetBOcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.065	378.496	0.268	0
0.057	378.334	0.26	0.219
0.06	378.403	0.261	0.273
0.062	378.44	0.263	0.279
0.031	377.846	0.294	0.495
0.03	377.818	0.299	0.656
0.035	377.917	0.285	0.787
0.021	377.645	0.327	1.015
0.013	377.507	0.351	1.354
0.012	377.473	0.355	1.484
0.013	377.492	0.351	1.633
0.011	377.458	0.358	1.811
0.012	377.483	0.354	1.952
0.009	377.421	0.364	2.164
0.007	377.383	0.371	2.278
0.005	377.348	0.379	2.406
0.004	377.32	0.384	2.55
0.005	377.339	0.377	2.605
0.005	377.347	0.376	2.616
0.005	377.341	0.38	2.63
0.004	377.33	0.38	2.647
0.006	377.37	0.374	2.663
0.007	377.385	0.371	2.668

GarnetBOcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.065	378.496	0.267	0
0.061	378.423	0.261	0.124
0.057	378.342	0.26	0.204
0.055	378.305	0.259	0.232
0.057	378.342	0.26	0.37
0.046	378.126	0.264	0.498
0.041	378.03	0.272	0.781
0.041	378.042	0.271	0.89
0.045	378.113	0.265	1.088
0.045	378.114	0.265	1.158
0.039	378.003	0.276	1.334
0.037	377.958	0.279	1.5
0.036	377.933	0.282	1.621
0.031	377.84	0.296	1.8
0.021	377.653	0.324	1.961
0.014	377.512	0.349	2.106
0.006	377.372	0.374	2.409
0.006	377.358	0.376	2.502
0.007	377.384	0.373	2.568
0.007	377.382	0.372	2.571
0.007	377.387	0.372	2.576
0.009	377.412	0.367	2.58
0.009	377.414	0.365	2.592

GarnetBPcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.24	381.858	0.891	0
0.235	381.768	0.878	0.162
0.228	381.629	0.848	0.252
0.232	381.705	0.862	0.29
0.231	381.689	0.856	0.507
0.228	381.622	0.844	0.762
0.227	381.602	0.841	1.056
0.232	381.714	0.862	1.268
0.225	381.563	0.829	1.547
0.222	381.518	0.825	1.829
0.219	381.465	0.812	2.108
0.222	381.517	0.82	2.37
0.216	381.408	0.802	2.598
0.213	381.351	0.79	2.815
0.206	381.207	0.761	3.038
0.206	381.2	0.761	3.253
0.2	381.099	0.737	3.502
0.192	380.934	0.703	3.73
0.185	380.803	0.678	3.908
0.188	380.854	0.688	4.106
0.183	380.756	0.669	4.271
0.178	380.676	0.649	4.511
0.174	380.599	0.635	4.687
0.171	380.542	0.626	4.904

0.167	380.452	0.61	5.13
0.159	380.301	0.579	5.328
0.153	380.181	0.554	5.534
0.146	380.046	0.529	5.67
0.141	379.957	0.512	5.871
0.137	379.885	0.497	6.068
0.128	379.7	0.463	6.291
0.129	379.729	0.469	6.529
0.12	379.546	0.433	6.761
0.112	379.397	0.406	6.942
0.105	379.269	0.382	7.131
0.095	379.083	0.349	7.34
0.086	378.9	0.318	7.54
0.076	378.709	0.291	7.723
0.069	378.57	0.272	7.879
0.06	378.406	0.262	8.099
0.051	378.235	0.26	8.322
0.04	378.012	0.274	8.548
0.032	377.861	0.292	8.682
0.027	377.759	0.307	8.879
0.027	377.759	0.308	9.096
0.022	377.68	0.323	9.275
0.014	377.511	0.349	9.546
0.009	377.422	0.364	9.716
0.007	377.385	0.372	9.916
0.006	377.363	0.376	10.097
0.006	377.368	0.373	10.3
0.007	377.373	0.371	10.318
0.006	377.372	0.374	10.332
0.006	377.36	0.374	10.336
0.006	377.357	0.376	10.342
0.005	377.339	0.38	10.349

GarnetBPcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.24	381.858	0.89	0
0.235	381.768	0.874	0.146
0.23	381.673	0.858	0.165
0.23	381.675	0.852	0.351
0.236	381.782	0.871	0.534
0.232	381.702	0.86	0.679
0.23	381.675	0.851	0.849
0.221	381.494	0.817	1.015
0.216	381.405	0.8	1.189
0.217	381.411	0.799	1.44
0.206	381.217	0.762	1.605
0.211	381.298	0.779	1.775
0.213	381.333	0.781	1.962
0.199	381.08	0.734	2.16
0.2	381.096	0.737	2.354
0.195	381.005	0.716	2.541
0.185	380.807	0.679	2.746
0.192	380.946	0.706	2.932
0.181	380.735	0.664	3.09
0.179	380.697	0.657	3.244
0.167	380.458	0.61	3.392
0.161	380.345	0.589	3.797
0.159	380.301	0.579	3.989
0.155	380.222	0.563	4.178
0.144	380.019	0.523	4.378
0.133	379.81	0.483	4.559
0.129	379.725	0.467	4.707
0.122	379.593	0.44	4.866
0.108	379.331	0.396	5.209
0.105	379.258	0.381	5.36
0.098	379.14	0.36	5.513
0.093	379.032	0.342	5.69
0.084	378.855	0.312	5.862
0.078	378.742	0.295	5.998
0.068	378.554	0.272	6.222
0.058	378.371	0.26	6.411
0.049	378.185	0.261	6.618
0.043	378.067	0.269	6.819
0.034	377.892	0.288	7.07
0.03	377.833	0.296	7.219
0.023	377.69	0.317	7.424
0.02	377.629	0.327	7.586
0.013	377.506	0.352	7.761
0.01	377.443	0.361	7.973
0.008	377.403	0.369	8.064
0.006	377.361	0.375	8.189
0.007	377.38	0.37	8.268
0.005	377.346	0.38	8.382
0.004	377.325	0.382	8.427

GarnetBQcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.174	380.593	0.633	1.279
0.16	380.323	0.583	1.493
0.149	380.116	0.542	1.743
0.147	380.068	0.531	1.973
0.139	379.927	0.506	2.275
0.123	379.606	0.447	2.59
0.116	379.483	0.424	2.888
0.099	379.159	0.364	3.143
0.085	378.882	0.316	3.459
0.072	378.633	0.28	3.821
0.067	378.544	0.272	4.056
0.057	378.341	0.26	4.342
0.052	378.247	0.261	4.603

0.045	378.113	0.266	4.873
0.039	378.004	0.275	5.138
0.028	377.794	0.301	5.458
0.022	377.675	0.321	5.728
0.015	377.528	0.349	6.013
0.009	377.422	0.365	6.24
0.006	377.362	0.374	6.478
0.006	377.368	0.373	6.705
0.007	377.392	0.372	6.746
0.007	377.373	0.373	6.781
0.008	377.395	0.37	6.788
0.008	377.401	0.366	6.796

GarnetBQcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.192	380.937	0.703	0
0.19	380.902	0.694	0.224
0.178	380.677	0.655	0.276
0.187	380.85	0.683	0.496
0.152	380.177	0.557	0.603
0.177	380.643	0.642	0.82
0.126	379.665	0.456	1.066
0.088	378.944	0.328	1.882
0.091	378.997	0.335	2.155
0.114	379.44	0.414	2.413
0.116	379.469	0.419	2.651
0.111	379.375	0.403	2.913
0.112	379.401	0.407	3.159
0.108	379.328	0.391	3.383
0.094	379.055	0.346	3.62
0.089	378.967	0.33	3.856
0.083	378.835	0.309	4.101
0.074	378.678	0.285	4.346
0.067	378.54	0.271	4.595
0.059	378.388	0.261	4.838
0.053	378.258	0.26	5.097
0.046	378.136	0.264	5.349
0.041	378.03	0.273	5.618
0.033	377.874	0.291	5.879
0.025	377.72	0.315	6.18
0.018	377.587	0.336	6.355
0.014	377.512	0.35	6.457
0.013	377.489	0.353	6.486
0.012	377.48	0.355	6.504
0.01	377.435	0.361	6.522

GarnetBRcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.236	381.788	0.877	0
0.232	381.704	0.86	0.217
0.233	381.736	0.868	0.451
0.228	381.622	0.844	0.646
0.232	381.704	0.86	0.901
0.22	381.484	0.818	1.147
0.216	381.39	0.796	1.347
0.213	381.342	0.783	1.555
0.209	381.273	0.775	1.769
0.212	381.316	0.78	2.024
0.197	381.041	0.724	2.245
0.195	380.998	0.713	2.512
0.187	380.843	0.686	2.77
0.183	380.759	0.666	3.01
0.178	380.674	0.653	3.249
0.169	380.505	0.617	3.449
0.161	380.333	0.584	3.649
0.162	380.358	0.588	3.951
0.144	380.022	0.524	4.269
0.139	379.924	0.505	4.471
0.13	379.746	0.472	4.666
0.119	379.535	0.43	4.985
0.111	379.389	0.406	5.241
0.103	379.226	0.374	5.516
0.086	378.903	0.318	5.86
0.075	378.696	0.288	6.152
0.072	378.637	0.281	6.465
0.061	378.428	0.263	6.764
0.053	378.265	0.259	7.087
0.045	378.114	0.265	7.339
0.042	378.057	0.271	7.584
0.032	377.86	0.292	7.848
0.029	377.802	0.301	8.05
0.024	377.716	0.313	8.264
0.019	377.607	0.333	8.462
0.013	377.495	0.352	8.718
0.008	377.401	0.37	8.988
0.007	377.383	0.371	9.248
0.007	377.386	0.37	9.426
0.006	377.354	0.378	9.591
0.005	377.349	0.377	9.713
0.006	377.358	0.374	9.743
0.007	377.377	0.371	9.755
0.007	377.373	0.372	9.771

GarnetBRcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.229	381.647	0.845	1.001
0.228	381.624	0.843	1.004
0.22	381.473	0.815	1.211

0.216	381.399	0.799	1.593
0.21	381.294	0.779	2.029
0.202	381.123	0.746	2.387
0.191	380.918	0.7	2.812
0.18	380.703	0.659	3.298
0.177	380.64	0.646	3.618
0.178	380.67	0.651	3.824
0.174	380.599	0.635	4.117
0.162	380.358	0.588	4.333
0.118	379.519	0.43	4.564
0.015	377.529	0.345	5.221
0.016	377.551	0.34	7.785
0.011	377.456	0.361	7.929
0.009	377.427	0.363	8.066
0.007	377.376	0.372	8.238
0.005	377.351	0.375	8.353
0.004	377.334	0.381	8.468
0.006	377.359	0.375	8.485
0.006	377.355	0.376	8.496

GarnetBTcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.015	377.529	0.347	0
0.013	377.506	0.352	0.11
0.013	377.496	0.351	0.366
0.014	377.508	0.35	0.568
0.014	377.509	0.35	0.676
0.013	377.5	0.35	0.831
0.013	377.491	0.352	1.229

GarnetBTcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.007	377.377	0.372	1.174
0.005	377.343	0.379	1.269
0.007	377.377	0.373	1.601

GarnetBUcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.143	380.001	0.519	0
0.133	379.797	0.479	0.168
0.125	379.642	0.451	0.312
0.117	379.498	0.425	0.49
0.114	379.432	0.415	0.577
0.102	379.207	0.374	0.676
0.095	379.072	0.348	0.843
0.094	379.059	0.345	0.927
0.083	378.847	0.311	1.097
0.074	378.679	0.286	1.22
0.066	378.514	0.27	1.315
0.065	378.495	0.266	1.388
0.062	378.448	0.263	1.497
0.055	378.307	0.259	1.609
0.048	378.169	0.262	1.769
0.046	378.135	0.264	1.866
0.042	378.051	0.272	2.06
0.038	377.982	0.277	2.174
0.037	377.962	0.278	2.292
0.031	377.849	0.295	2.459
0.027	377.765	0.306	2.653
0.024	377.707	0.316	2.771
0.021	377.649	0.328	2.883
0.022	377.677	0.32	2.984
0.019	377.61	0.332	3.096
0.017	377.568	0.339	3.235
0.011	377.451	0.358	3.377
0.009	377.413	0.366	3.497
0.007	377.376	0.371	3.634
0.006	377.366	0.375	3.749
0.007	377.391	0.371	3.841
0.011	377.458	0.356	3.879

GarnetBUcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.143	380.001	0.517	0
0.125	379.657	0.454	0.285
0.128	379.713	0.466	0.292
0.117	379.5	0.425	0.452
0.108	379.323	0.392	0.672
0.096	379.097	0.352	0.891
0.085	378.885	0.317	1.102
0.074	378.671	0.284	1.329
0.057	378.339	0.261	1.556
0.053	378.27	0.259	1.807
0.047	378.146	0.263	1.977
0.037	377.968	0.278	2.233
0.035	377.93	0.285	2.414
0.03	377.815	0.3	2.58
0.026	377.743	0.309	2.805
0.018	377.588	0.335	3.074
0.013	377.503	0.349	3.303
0.01	377.44	0.362	3.465
0.009	377.418	0.367	3.649
0.005	377.347	0.379	3.855
0.006	377.368	0.374	4.005
0.006	377.358	0.376	4.121
0.007	377.375	0.372	4.207

0.007	377.373	0.371	4.237

GarnetBWcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.172	380.56	0.63	0.438
0.17	380.511	0.618	0.515
0.168	380.484	0.614	0.628
0.162	380.358	0.588	0.753
0.157	380.274	0.569	0.902
0.152	380.171	0.556	1.112
0.152	380.161	0.549	1.404
0.142	379.974	0.513	1.498
0.143	380	0.519	1.611
0.134	379.828	0.486	1.772
0.132	379.792	0.479	1.89
0.127	379.698	0.462	2.019
0.123	379.619	0.447	2.159
0.118	379.523	0.43	2.364
0.115	379.465	0.417	2.537
0.105	379.273	0.383	2.713
0.097	379.113	0.355	2.907
0.095	379.065	0.347	3.071
0.082	378.814	0.305	3.276
0.073	378.642	0.281	3.454
0.071	378.606	0.278	3.623
0.063	378.456	0.265	3.728
0.058	378.36	0.26	3.884
0.053	378.264	0.26	4.037
0.043	378.077	0.268	4.144
0.031	377.847	0.294	4.338
0.021	377.652	0.326	4.587
0.014	377.515	0.349	4.85
0.006	377.36	0.374	5.198
0.005	377.343	0.377	5.344
0.004	377.33	0.381	5.444
0.004	377.331	0.38	5.571
0.005	377.344	0.377	5.717
0.007	377.375	0.373	5.842
0.007	377.373	0.375	5.928

GarnetBWcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.175	380.617	0.641	0
0.17	380.519	0.622	0.306
0.163	380.373	0.591	0.65
0.149	380.11	0.54	1
0.14	379.946	0.511	1.185
0.129	379.726	0.467	1.458
0.117	379.492	0.423	1.816
0.106	379.277	0.383	2.062
0.096	379.09	0.351	2.262
0.079	378.76	0.297	2.647
0.067	378.54	0.27	2.913
0.055	378.303	0.259	3.223
0.045	378.12	0.265	3.493
0.034	377.897	0.288	3.835
0.024	377.712	0.315	4.129
0.016	377.552	0.342	4.461
0.011	377.457	0.357	4.707
0.007	377.375	0.371	4.974
0.005	377.346	0.377	5.214
0.006	377.364	0.374	5.326
0.007	377.374	0.372	5.342
0.007	377.383	0.372	5.356
0.007	377.386	0.373	5.366

GarnetBXcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.089	378.956	0.327	0
0.086	378.899	0.318	0.119
0.082	378.822	0.307	0.27
0.08	378.795	0.301	0.384
0.075	378.688	0.286	0.492
0.072	378.634	0.281	0.602
0.066	378.516	0.269	0.71
0.06	378.394	0.261	0.877
0.046	378.123	0.264	1.002
0.039	377.999	0.276	1.103
0.037	377.965	0.277	1.112
0.037	377.952	0.279	1.117
0.036	377.942	0.283	1.125

GarnetBXcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.087	378.911	0.321	0.233
0.084	378.86	0.314	0.246
0.083	378.846	0.311	0.249
0.076	378.701	0.289	0.316
0.089	378.955	0.328	0.372
0.069	378.572	0.274	0.477
0.065	378.493	0.267	0.609
0.056	378.328	0.26	0.752
0.049	378.189	0.261	0.972
0.036	377.934	0.283	1.347
0.028	377.789	0.304	1.53
0.025	377.729	0.314	1.64

0.024	377.714	0.315	1.745
0.015	377.544	0.343	1.894
0.013	377.491	0.352	2.013
0.012	377.472	0.356	2.089
0.009	377.428	0.362	2.275
0.008	377.401	0.368	2.392
0.008	377.393	0.369	2.51
0.008	377.393	0.372	2.626
0.008	377.408	0.368	2.703
0.007	377.388	0.369	2.703
0.007	377.377	0.37	2.704
0.006	377.371	0.373	2.705
0.008	377.395	0.369	2.768

GarnetBcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.144	380.022	0.523	0
0.12	379.56	0.434	0.18
0.132	379.779	0.476	0.203
0.122	379.587	0.439	0.324
0.121	379.576	0.437	0.371
0.141	379.958	0.512	0.587
0.093	379.027	0.338	0.671
0.132	379.787	0.479	0.742
0.093	379.028	0.342	0.888
0.131	379.759	0.472	0.923
0.083	378.849	0.31	0.962
0.096	379.099	0.353	1.111
0.132	379.792	0.48	1.112
0.129	379.728	0.468	1.288
0.093	379.031	0.341	1.299
0.09	378.984	0.333	1.504
0.086	378.893	0.317	1.659
0.086	378.895	0.32	1.834
0.085	378.872	0.314	2.016
0.075	378.693	0.289	2.213
0.066	378.525	0.27	2.412
0.067	378.543	0.271	2.59
0.061	378.412	0.262	2.743
0.056	378.322	0.26	2.937
0.054	378.281	0.259	3.074
0.046	378.138	0.264	3.321
0.034	377.909	0.286	3.541
0.016	377.558	0.34	4.019
0.021	377.649	0.324	4.088
0.019	377.614	0.331	4.277
0.019	377.618	0.33	4.439
0.015	377.534	0.343	4.632
0.014	377.516	0.346	4.847
0.011	377.453	0.36	4.973
0.008	377.404	0.369	5.202
0.008	377.398	0.368	5.38
0.006	377.364	0.375	5.544
0.006	377.365	0.375	5.824
0.005	377.351	0.377	5.939
0.005	377.352	0.376	6.017

GarnetBcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.137	379.889	0.498	0.878
0.137	379.882	0.496	0.914
0.136	379.86	0.494	0.999
0.139	379.92	0.505	1.067
0.132	379.783	0.475	1.169
0.124	379.637	0.447	1.253
0.122	379.597	0.443	1.323
0.12	379.56	0.433	1.45
0.118	379.514	0.427	1.652
0.111	379.391	0.406	2.11
0.103	379.223	0.374	2.205
0.087	378.916	0.322	2.376

GarnetCAcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.145	380.028	0.524	0
0.122	379.592	0.441	0.551
0.122	379.593	0.442	0.584
0.094	379.049	0.344	0.635
0.13	379.738	0.469	0.658
0.12	379.558	0.437	0.83
0.112	379.4	0.405	0.933
0.08	378.793	0.303	1.148
0.074	378.668	0.284	1.319
0.09	378.975	0.333	1.538
0.076	378.701	0.289	1.965
0.069	378.566	0.273	2.186
0.062	378.444	0.264	2.355
0.057	378.346	0.26	2.585
0.048	378.178	0.261	2.761
0.043	378.076	0.268	2.971
0.037	377.964	0.279	3.136
0.035	377.929	0.284	3.375
0.032	377.871	0.291	3.571
0.022	377.665	0.323	3.781
0.017	377.572	0.337	4.035
0.011	377.464	0.357	4.206
0.008	377.402	0.367	4.465
0.005	377.341	0.378	4.628

0.004	377.317	0.383	4.787
0.005	377.339	0.38	4.872

GarnetCAcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.145	380.028	0.524	0
0.131	379.761	0.475	0.21
0.091	378.995	0.336	0.545
0.093	379.043	0.343	0.796
0.124	379.632	0.451	0.989
0.121	379.566	0.437	1.204
0.117	379.496	0.425	1.432
0.112	379.391	0.405	1.611
0.095	379.068	0.346	1.816
0.098	379.13	0.359	2.001
0.092	379.012	0.337	2.189
0.082	378.816	0.307	2.42
0.068	378.552	0.274	2.701
0.06	378.396	0.261	2.91
0.045	378.107	0.266	3.132
0.018	377.587	0.337	3.359
0.01	377.434	0.36	3.514
0.007	377.385	0.37	3.575
0.006	377.37	0.372	3.604
0.007	377.379	0.372	3.621

GarnetCBcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.072	378.636	0.281	0
0.071	378.613	0.278	0.151
0.067	378.529	0.27	0.312
0.064	378.472	0.266	0.421
0.059	378.376	0.261	0.623
0.054	378.287	0.259	0.769
0.05	378.205	0.26	0.934
0.047	378.157	0.264	1.025
0.044	378.091	0.267	1.149
0.045	378.109	0.266	1.258
0.039	377.998	0.276	1.403
0.037	377.952	0.281	1.51
0.037	377.955	0.28	1.662
0.031	377.852	0.294	1.809
0.025	377.72	0.314	1.95
0.02	377.641	0.326	2.092
0.012	377.48	0.356	2.235
0.009	377.429	0.362	2.396
0.006	377.372	0.375	2.555
0.006	377.368	0.371	2.668
0.006	377.366	0.374	2.804
0.006	377.371	0.372	2.829
0.007	377.387	0.369	2.847
0.006	377.364	0.376	2.862
0.007	377.376	0.373	2.885

GarnetCBcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.072	378.636	0.281	0
0.069	378.58	0.275	0.133
0.069	378.568	0.274	0.296
0.057	378.348	0.259	0.443
0.051	378.228	0.258	0.655
0.046	378.14	0.264	0.813
0.043	378.068	0.269	1.016
0.043	378.072	0.268	1.202
0.039	377.997	0.276	1.388
0.033	377.879	0.29	1.586
0.026	377.752	0.308	1.828
0.017	377.579	0.336	2.035
0.01	377.44	0.36	2.279
0.007	377.379	0.371	2.475
0.006	377.364	0.376	2.722
0.005	377.34	0.378	2.958
0.007	377.376	0.373	3.034
0.005	377.342	0.377	3.06

GarnetCCcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.213	381.339	0.787	0
0.193	380.964	0.709	0.524
0.189	380.873	0.69	0.761
0.193	380.959	0.707	0.932
0.181	380.72	0.66	1.232
0.178	380.666	0.649	1.527
0.18	380.711	0.656	1.731
0.172	380.545	0.629	1.941
0.171	380.525	0.623	2.191
0.153	380.19	0.555	2.536
0.149	380.108	0.541	2.776
0.149	380.104	0.537	2.845
0.146	380.05	0.53	2.948
0.142	379.974	0.513	3.104
0.133	379.801	0.483	3.295
0.13	379.748	0.469	3.508
0.125	379.642	0.451	3.717
0.102	379.213	0.373	4.149
0.093	379.04	0.343	4.4

0.086	378.898	0.32	4.599
0.082	378.814	0.306	4.797
0.069	378.58	0.275	5.002
0.057	378.351	0.26	5.264
0.051	378.224	0.26	5.42
0.045	378.105	0.266	5.594
0.041	378.04	0.271	5.793
0.038	377.982	0.277	5.983
0.038	377.974	0.278	6.132
0.026	377.752	0.309	6.318
0.019	377.607	0.335	6.568
0.016	377.561	0.34	6.792
0.012	377.476	0.355	6.935
0.009	377.425	0.363	7.031
0.008	377.407	0.367	7.103
0.005	377.352	0.377	7.207
0.006	377.371	0.373	7.311
0.006	377.353	0.377	7.376
0.006	377.371	0.373	7.426

GarnetCCcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.156	380.243	0.567	1.465
0.156	380.239	0.567	1.519
0.17	380.52	0.62	1.528
0.169	380.499	0.618	1.642
0.186	380.829	0.681	1.643
0.198	381.047	0.727	1.646
0.162	380.364	0.59	1.671
0.202	381.139	0.747	1.7
0.157	380.267	0.571	1.832
0.123	379.616	0.446	2.489
0.135	379.844	0.491	3.003
0.152	380.162	0.553	3.334
0.148	380.091	0.54	3.496
0.145	380.029	0.525	3.626
0.142	379.986	0.517	3.888
0.138	379.903	0.502	4.1
0.134	379.816	0.487	4.277
0.127	379.691	0.46	4.564
0.122	379.593	0.444	4.75
0.108	379.329	0.394	4.976
0.075	378.695	0.29	5.216
0.074	378.662	0.283	5.302
0.063	378.463	0.265	5.507
0.042	378.054	0.27	5.627
0.027	377.767	0.307	5.851
0.011	377.455	0.358	6.016
0.01	377.433	0.362	7.244
0.011	377.457	0.358	7.419
0.01	377.439	0.362	7.56
0.008	377.411	0.365	7.714
0.007	377.374	0.374	7.843
0.006	377.358	0.373	7.938
0.007	377.386	0.369	7.991
0.007	377.379	0.37	8.028
0.007	377.386	0.371	8.069
0.007	377.384	0.37	8.102

GarnetCDcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.187	380.845	0.685	0
0.181	380.731	0.661	0.149
0.182	380.743	0.663	0.173
0.185	380.803	0.677	0.303
0.177	380.649	0.645	0.327
0.171	380.535	0.622	0.44
0.174	380.599	0.634	0.463
0.17	380.51	0.619	0.534
0.169	380.49	0.615	0.631
0.17	380.514	0.621	0.636
0.165	380.425	0.604	0.776
0.162	380.363	0.592	0.909
0.151	380.148	0.547	1.097
0.157	380.269	0.57	1.254
0.148	380.085	0.536	1.403
0.142	379.985	0.514	1.568
0.141	379.965	0.513	1.671
0.12	379.545	0.432	1.907
0.105	379.269	0.38	2.436
0.1	379.176	0.365	2.544
0.103	379.226	0.374	2.677
0.103	379.223	0.376	2.804
0.096	379.101	0.355	2.959
0.093	379.031	0.341	3.095
0.093	379.033	0.341	3.204
0.077	378.733	0.294	3.41
0.083	378.846	0.31	3.565
0.077	378.721	0.29	3.678
0.072	378.629	0.281	3.824
0.065	378.506	0.268	4.012
0.064	378.478	0.266	4.176
0.06	378.409	0.261	4.304
0.058	378.364	0.26	4.474
0.056	378.324	0.259	4.637
0.051	378.227	0.26	4.815
0.043	378.077	0.269	5.021
0.042	378.054	0.269	5.16
0.039	378.006	0.275	5.357
0.036	377.943	0.28	5.526

0.037	377.958	0.28	5.659
0.034	377.892	0.289	5.816
0.029	377.803	0.301	5.999
0.023	377.696	0.317	6.135
0.017	377.573	0.337	6.295
0.013	377.499	0.35	6.492
0.011	377.459	0.356	6.644
0.007	377.382	0.371	6.839
0.007	377.373	0.373	7.031
0.005	377.35	0.375	7.199
0.006	377.368	0.374	7.243
0.006	377.355	0.376	7.249

GarnetCDcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.187	380.845	0.687	0
0.176	380.623	0.641	0.333
0.183	380.765	0.67	0.39
0.174	380.59	0.636	0.413
0.176	380.638	0.644	0.509
0.173	380.566	0.632	0.532
0.177	380.64	0.647	0.68
0.169	380.494	0.613	0.715
0.142	379.969	0.512	1.197
0.151	380.157	0.547	1.329
0.152	380.165	0.551	2.044
0.15	380.139	0.545	2.189
0.156	380.253	0.569	2.346
0.152	380.177	0.549	2.599
0.152	380.161	0.553	2.825
0.148	380.093	0.537	3.003
0.145	380.038	0.527	3.204
0.146	380.061	0.531	3.408
0.141	379.963	0.51	3.595
0.134	379.83	0.485	3.781
0.135	379.851	0.492	3.994
0.13	379.741	0.47	4.196
0.118	379.521	0.427	4.447
0.117	379.504	0.424	4.6
0.111	379.387	0.404	4.854
0.105	379.26	0.381	5.016
0.097	379.121	0.355	5.215
0.094	379.05	0.344	5.414
0.086	378.902	0.32	5.629
0.073	378.644	0.283	5.842
0.069	378.576	0.275	6.022
0.059	378.379	0.261	6.25
0.054	378.289	0.259	6.421
0.047	378.158	0.262	6.634
0.037	377.954	0.279	6.85
0.039	377.988	0.275	7.048
0.029	377.802	0.301	7.248
0.023	377.699	0.317	7.459
0.017	377.566	0.338	7.699
0.008	377.41	0.368	7.881
0.007	377.388	0.369	8.045
0.006	377.366	0.374	8.3
0.007	377.38	0.372	8.449
0.007	377.383	0.37	8.507
0.007	377.389	0.372	8.51
0.007	377.379	0.371	8.596
0.007	377.377	0.371	8.611
0.007	377.388	0.368	8.629
0.007	377.387	0.37	8.642

GarnetCEcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.218	381.442	0.805	0
0.204	381.178	0.754	0.316
0.201	381.117	0.739	0.458
0.196	381.019	0.719	0.585
0.196	381.024	0.721	0.743
0.197	381.041	0.722	0.891
0.194	380.975	0.712	1.015
0.194	380.981	0.711	1.174
0.182	380.754	0.664	1.342
0.182	380.754	0.667	1.489
0.178	380.67	0.651	1.69
0.175	380.603	0.637	1.823
0.166	380.442	0.608	1.965
0.144	380.009	0.523	2.12
0.131	379.773	0.476	2.292
0.12	379.551	0.434	2.486
0.124	379.625	0.445	2.636
0.115	379.455	0.416	2.841
0.102	379.217	0.373	2.929
0.093	379.027	0.341	3.263
0.088	378.947	0.328	3.682
0.088	378.932	0.325	3.786
0.07	378.602	0.277	3.953
0.074	378.671	0.285	4.122
0.06	378.408	0.262	4.293
0.054	378.294	0.26	4.416
0.046	378.137	0.264	4.588
0.038	377.977	0.278	4.724
0.031	377.842	0.296	4.905
0.021	377.661	0.325	5.07
0.014	377.513	0.348	5.382
0.01	377.436	0.364	5.471
0.01	377.446	0.359	5.613

0.009	377.43	0.364	5.766
0.007	377.384	0.371	5.888
0.007	377.382	0.372	6.081
0.007	377.373	0.372	6.232
0.005	377.353	0.374	6.371
0.006	377.371	0.375	6.503
0.005	377.353	0.377	6.659
0.006	377.357	0.375	6.842
0.007	377.382	0.37	6.96
0.005	377.34	0.38	7.106
0.006	377.362	0.376	7.259
0.005	377.351	0.378	7.43
0.006	377.362	0.375	7.551
0.007	377.385	0.368	7.633
0.005	377.353	0.376	7.644
0.007	377.386	0.369	7.658
0.006	377.36	0.373	7.669
0.006	377.365	0.373	7.67

GarnetCEcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.185	380.802	0.677	0.242
0.184	380.789	0.676	0.436
0.177	380.653	0.649	0.631
0.179	380.692	0.658	0.884
0.184	380.785	0.672	1.161
0.188	380.863	0.688	1.372
0.185	380.812	0.682	1.554
0.186	380.818	0.684	1.778
0.189	380.875	0.692	1.98
0.189	380.873	0.694	2.18
0.187	380.851	0.686	2.389
0.176	380.621	0.643	2.653
0.179	380.689	0.657	2.755
0.173	380.569	0.633	2.954
0.172	380.56	0.629	3.16
0.164	380.404	0.595	3.363
0.165	380.419	0.602	3.599
0.161	380.339	0.588	3.759
0.156	380.253	0.57	4.007
0.156	380.243	0.568	4.148
0.152	380.174	0.553	4.488
0.151	380.143	0.546	4.625
0.14	379.942	0.511	4.775
0.131	379.765	0.472	4.962
0.119	379.529	0.429	5.203
0.117	379.501	0.424	5.349
0.108	379.32	0.391	5.598
0.103	379.228	0.376	5.827
0.081	378.813	0.306	6.074
0.062	378.447	0.264	6.442
0.077	378.726	0.294	6.616
0.063	378.456	0.265	6.814
0.056	378.318	0.26	7.049
0.055	378.302	0.259	7.238
0.055	378.303	0.26	7.423
0.05	378.203	0.261	7.645
0.044	378.099	0.265	7.831
0.042	378.052	0.271	8.055
0.039	377.991	0.277	8.229
0.036	377.938	0.281	8.403
0.035	377.916	0.286	8.627
0.029	377.798	0.303	8.847
0.021	377.653	0.325	9.039
0.017	377.568	0.339	9.214
0.013	377.5	0.35	9.444
0.01	377.441	0.362	9.661
0.009	377.413	0.365	9.825
0.007	377.379	0.371	9.919
0.008	377.396	0.368	9.944
0.008	377.407	0.367	9.952
0.007	377.381	0.374	9.961

GarnetCGcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.056	378.32	0.26	0
0.054	378.286	0.259	0.256
0.049	378.197	0.262	0.584
0.05	378.204	0.261	0.736
0.047	378.142	0.264	0.951
0.049	378.191	0.261	1.166
0.044	378.095	0.267	1.581
0.042	378.063	0.271	1.767
0.038	377.974	0.279	1.987
0.032	377.861	0.292	2.169
0.029	377.809	0.301	2.362
0.03	377.831	0.297	2.567
0.029	377.805	0.301	2.786
0.027	377.774	0.306	2.982
0.02	377.624	0.329	3.22
0.016	377.549	0.342	3.353
0.01	377.431	0.364	3.605
0.006	377.369	0.374	3.799
0.005	377.353	0.377	3.98
0.005	377.349	0.377	4.188
0.005	377.35	0.377	4.244
0.005	377.346	0.378	4.271
0.007	377.377	0.375	4.29
0.006	377.357	0.375	4.299

GarnetCGcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.046	378.128	0.264	0.839
0.047	378.148	0.263	0.871
0.044	378.089	0.267	0.872
0.038	377.982	0.277	0.949
0.037	377.952	0.281	1.039
0.032	377.855	0.293	1.127
0.029	377.8	0.301	1.239
0.023	377.696	0.316	1.351
0.02	377.634	0.328	1.48
0.019	377.609	0.332	1.596
0.012	377.488	0.353	1.711
0.011	377.464	0.356	1.827
0.01	377.431	0.363	1.928
0.009	377.418	0.364	2.035
0.007	377.374	0.373	2.191
0.006	377.358	0.376	2.326
0.006	377.361	0.375	2.437
0.005	377.34	0.381	2.595
0.005	377.34	0.378	2.618
0.006	377.368	0.373	2.627
0.006	377.362	0.376	2.638

GarnetCHcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.247	381.989	0.916	0
0.229	381.656	0.847	0.273
0.236	381.779	0.874	0.411
0.231	381.685	0.856	0.537
0.228	381.632	0.847	0.683
0.217	381.422	0.803	0.809
0.225	381.579	0.837	0.952
0.226	381.595	0.84	1.12
0.21	381.291	0.778	1.283
0.215	381.374	0.795	1.422
0.202	381.122	0.742	1.556
0.206	381.216	0.762	1.688
0.202	381.126	0.747	1.875
0.192	380.941	0.705	1.984
0.186	380.814	0.678	2.163
0.179	380.692	0.657	2.324
0.178	380.662	0.648	2.434
0.172	380.55	0.628	2.615
0.169	380.498	0.621	2.775
0.169	380.487	0.617	2.915
0.155	380.227	0.561	3.081
0.152	380.178	0.554	3.231
0.146	380.061	0.529	3.387
0.148	380.088	0.534	3.51
0.124	379.624	0.446	3.667
0.106	379.285	0.386	3.83
0.054	378.278	0.26	4.248
0.061	378.413	0.263	4.575
0.075	378.686	0.288	4.701
0.073	378.653	0.283	5.132
0.046	378.138	0.263	5.276
0.056	378.326	0.259	5.426
0.042	378.049	0.271	5.544
0.038	377.973	0.278	5.737
0.037	377.954	0.28	5.888
0.031	377.852	0.294	6.046
0.028	377.778	0.303	6.218
0.025	377.721	0.314	6.382
0.024	377.716	0.315	6.542
0.022	377.678	0.323	6.69
0.019	377.607	0.331	6.864
0.016	377.549	0.341	7.025
0.012	377.475	0.355	7.134
0.01	377.448	0.361	7.331
0.008	377.398	0.367	7.456
0.006	377.37	0.373	7.618
0.006	377.364	0.375	7.739
0.006	377.36	0.374	7.913
0.006	377.359	0.375	8.064
0.006	377.36	0.373	8.091
0.006	377.355	0.377	8.123
0.005	377.349	0.378	8.131
0.007	377.382	0.371	8.143
0.007	377.381	0.373	8.153

GarnetCHcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.247	381.989	0.921	0
0.23	381.668	0.85	0.117
0.223	381.53	0.826	0.251
0.219	381.453	0.809	0.413
0.221	381.502	0.821	0.519
0.219	381.452	0.811	0.682
0.221	381.505	0.821	0.83
0.219	381.461	0.811	1.03
0.213	381.348	0.786	1.174
0.217	381.41	0.805	1.334
0.204	381.167	0.751	1.479
0.209	381.264	0.767	1.66
0.203	381.141	0.746	1.854
0.201	381.103	0.737	2.017
0.192	380.937	0.706	2.193

0.192	380.935	0.703	2.476
0.183	380.764	0.668	2.615
0.165	380.427	0.602	2.776
0.159	380.306	0.581	2.953
0.164	380.401	0.598	3.154
0.169	380.505	0.62	3.259
0.165	380.412	0.599	3.41
0.162	380.357	0.588	3.531
0.156	380.244	0.565	3.699
0.151	380.146	0.544	3.968
0.135	379.843	0.488	4.158
0.136	379.86	0.49	4.358
0.124	379.627	0.449	4.591
0.12	379.55	0.433	4.742
0.118	379.518	0.426	4.924
0.109	379.344	0.398	5.126
0.098	379.137	0.358	5.301
0.082	378.833	0.307	5.551
0.073	378.65	0.282	5.773
0.059	378.381	0.262	5.968
0.056	378.329	0.26	6.16
0.047	378.155	0.263	6.369
0.041	378.039	0.272	6.585
0.033	377.888	0.289	6.848
0.028	377.792	0.303	6.982
0.018	377.598	0.334	7.123
0.018	377.588	0.337	7.173
0.015	377.534	0.346	7.217
0.015	377.538	0.343	7.228
0.014	377.514	0.351	7.236
0.014	377.511	0.351	7.243
0.014	377.514	0.348	7.245

GarnetCIcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.204	381.162	0.749	1.533
0.206	381.214	0.762	1.738
0.202	381.126	0.74	1.983
0.207	381.227	0.76	2.153
0.208	381.249	0.766	2.367
0.199	381.071	0.734	2.592
0.203	381.144	0.744	2.771
0.195	380.997	0.719	2.908
0.198	381.058	0.73	3.089
0.198	381.057	0.731	3.319
0.185	380.806	0.675	3.544
0.187	380.837	0.684	3.811
0.171	380.528	0.62	4.025
0.172	380.549	0.628	4.244
0.17	380.514	0.619	4.458
0.157	380.267	0.572	4.688
0.149	380.103	0.54	4.826
0.149	380.115	0.542	5.054
0.138	379.899	0.5	5.333
0.131	379.769	0.474	5.506
0.114	379.445	0.415	5.664
0.116	379.469	0.421	5.853
0.107	379.298	0.387	6.016
0.103	379.223	0.375	6.211
0.087	378.917	0.323	6.505
0.076	378.717	0.292	6.78
0.069	378.569	0.273	6.952
0.056	378.329	0.259	7.226
0.045	378.104	0.266	7.47
0.042	378.047	0.272	7.687
0.032	377.863	0.292	7.851
0.029	377.804	0.301	8.115
0.022	377.672	0.323	8.287
0.016	377.563	0.34	8.507
0.008	377.405	0.367	8.803
0.007	377.384	0.371	8.884
0.005	377.346	0.377	8.986
0.006	377.356	0.375	9.017
0.006	377.36	0.375	9.045
0.006	377.361	0.373	9.111

GarnetCIcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.226	381.6	0.836	0
0.214	381.357	0.786	0.339
0.172	380.555	0.626	1.188
0.151	380.155	0.547	2.19
0.168	380.479	0.611	2.783
0.163	380.374	0.593	2.939
0.154	380.209	0.56	3.23
0.147	380.073	0.533	3.356
0.119	379.54	0.433	3.835
0.087	378.914	0.321	4.282
0.064	378.483	0.267	4.541
0.082	378.82	0.306	5.251
0.073	378.658	0.281	5.433
0.071	378.621	0.279	5.434
0.062	378.432	0.264	5.577
0.047	378.161	0.263	5.71
0.04	378.013	0.275	5.968
0.035	377.911	0.285	6.228
0.026	377.75	0.31	6.422
0.016	377.552	0.341	6.675
0.012	377.475	0.356	6.799
0.007	377.38	0.371	6.994

0.006	377.358	0.374	7.06
0.008	377.394	0.369	7.089
0.007	377.384	0.373	7.096

GarnetCJcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.149	380.121	0.543	0
0.139	379.912	0.502	0.113
0.139	379.916	0.503	0.424
0.138	379.906	0.502	0.727
0.129	379.735	0.467	1.025
0.123	379.618	0.448	1.339
0.114	379.443	0.416	1.572
0.111	379.388	0.401	1.572
0.109	379.341	0.396	1.77
0.102	379.215	0.374	2
0.093	379.038	0.342	2.273
0.087	378.919	0.323	2.553
0.076	378.699	0.289	2.848
0.071	378.611	0.278	3.207
0.064	378.48	0.267	3.479
0.05	378.204	0.261	3.825
0.048	378.171	0.262	4.008
0.041	378.028	0.273	4.312
0.033	377.873	0.292	4.637
0.027	377.761	0.308	4.892
0.022	377.676	0.322	5.224
0.016	377.548	0.342	5.433
0.013	377.489	0.352	5.67
0.01	377.435	0.362	5.752
0.01	377.447	0.36	5.777

GarnetCJcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.149	380.121	0.544	0
0.134	379.819	0.481	0.333
0.141	379.952	0.51	0.344
0.122	379.59	0.439	0.599
0.109	379.333	0.394	0.796
0.103	379.228	0.374	1.009
0.095	379.07	0.348	1.34
0.083	378.843	0.311	1.615
0.077	378.725	0.291	1.864
0.068	378.556	0.272	2.123
0.059	378.389	0.261	2.409
0.046	378.129	0.264	2.688
0.04	378.025	0.274	2.877
0.034	377.91	0.285	3.094
0.028	377.794	0.302	3.356
0.022	377.672	0.321	3.57
0.017	377.57	0.339	3.837
0.009	377.424	0.366	4.108
0.006	377.354	0.376	4.36
0.005	377.349	0.376	4.546
0.005	377.347	0.378	4.629
0.007	377.373	0.375	4.697
0.006	377.363	0.376	4.709
0.007	377.374	0.372	4.721
0.007	377.379	0.374	4.754

GarnetCKcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.171	380.541	0.625	1.87
0.174	380.599	0.639	1.966
0.193	380.96	0.706	2.151
0.161	380.345	0.582	2.505
0.162	380.352	0.588	2.531
0.184	380.78	0.671	2.579
0.191	380.919	0.701	2.607
0.178	380.678	0.651	2.617
0.17	380.514	0.617	2.637
0.152	380.172	0.551	2.658
0.144	380.022	0.523	2.663
0.163	380.378	0.591	2.686
0.15	380.129	0.546	2.705
0.182	380.746	0.666	2.722
0.153	380.182	0.556	2.745
0.173	380.576	0.63	2.762
0.176	380.637	0.644	2.901
0.163	380.38	0.596	2.918
0.165	380.418	0.601	3.046
0.174	380.599	0.636	3.161
0.172	380.549	0.626	3.264
0.173	380.564	0.63	3.447
0.164	380.408	0.597	3.592
0.181	380.723	0.667	3.809
0.19	380.896	0.7	3.934
0.188	380.857	0.687	4.079
0.163	380.377	0.59	4.191
0.159	380.3	0.58	4.237
0.123	379.617	0.446	4.439
0.096	379.093	0.352	4.442
0.084	378.867	0.314	4.612
0.029	377.8	0.302	5.138
0.021	377.642	0.325	5.284
0.022	377.663	0.322	5.416
0.028	377.782	0.305	5.552
0.03	377.82	0.298	5.667

0.03	377.826	0.296	5.801
0.031	377.845	0.295	5.928
0.03	377.828	0.297	6.069
0.026	377.751	0.306	6.219
0.023	377.696	0.317	6.366
0.022	377.665	0.324	6.49
0.021	377.651	0.324	6.571
0.016	377.564	0.34	6.72
0.013	377.499	0.351	6.859
0.009	377.426	0.364	6.994
0.008	377.395	0.37	7.125
0.007	377.387	0.371	7.243
0.006	377.359	0.375	7.299
0.006	377.37	0.373	7.301
0.006	377.369	0.373	7.301
0.005	377.349	0.377	7.338
0.006	377.359	0.374	7.353
0.005	377.34	0.38	7.354
0.006	377.368	0.374	7.36
0.005	377.345	0.377	7.374

GarnetCKcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.213	381.35	0.789	0
0.205	381.181	0.756	0.172
0.204	381.169	0.749	0.402
0.209	381.268	0.768	0.59
0.208	381.255	0.765	0.789
0.206	381.201	0.759	0.994
0.199	381.069	0.732	1.218
0.192	380.93	0.706	1.407
0.194	380.974	0.707	1.591
0.182	380.745	0.666	1.772
0.185	380.808	0.677	1.978
0.171	380.537	0.627	2.19
0.162	380.365	0.59	2.395
0.146	380.059	0.531	2.595
0.146	380.05	0.53	2.811
0.144	380.012	0.522	3.007
0.097	379.105	0.353	3.222
0.024	377.707	0.316	3.925
0.02	377.633	0.33	3.998
0.019	377.604	0.332	4.497
0.014	377.522	0.346	4.633
0.01	377.439	0.362	4.764
0.01	377.439	0.362	5.025
0.01	377.436	0.363	5.264
0.009	377.42	0.365	5.402
0.01	377.441	0.359	5.552
0.012	377.471	0.355	5.761
0.007	377.385	0.371	6.008
0.006	377.365	0.374	6.204
0.006	377.356	0.373	6.398
0.006	377.373	0.373	6.654
0.006	377.365	0.373	6.739
0.006	377.369	0.373	6.761
0.005	377.345	0.38	6.77
0.007	377.382	0.371	6.779
0.006	377.369	0.373	6.806
0.006	377.363	0.374	6.834

GarnetCcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.199	381.07	0.732	0
0.19	380.896	0.695	0.137
0.196	381.024	0.721	0.249
0.192	380.939	0.701	0.345
0.194	380.968	0.711	0.474
0.183	380.767	0.671	0.615
0.186	380.814	0.679	0.855
0.188	380.864	0.688	1.096
0.18	380.714	0.659	1.339
0.186	380.831	0.685	1.559
0.182	380.748	0.664	1.807
0.174	380.584	0.634	2.049
0.17	380.519	0.62	2.292
0.162	380.37	0.591	2.528
0.16	380.317	0.581	2.779
0.156	380.245	0.564	3.011
0.155	380.218	0.562	3.248
0.157	380.262	0.571	3.497
0.157	380.256	0.57	3.735
0.15	380.126	0.543	3.975
0.142	379.968	0.51	4.22
0.132	379.792	0.478	4.456
0.132	379.786	0.479	4.697
0.122	379.594	0.444	4.932
0.101	379.18	0.368	5.416
0.101	379.187	0.368	5.895
0.096	379.092	0.352	6.132
0.086	378.898	0.32	6.375
0.078	378.754	0.296	6.634
0.068	378.564	0.273	6.857
0.065	378.499	0.268	7.093
0.055	378.307	0.26	7.335
0.053	378.27	0.26	7.57
0.044	378.089	0.267	7.814
0.042	378.054	0.27	8.056
0.033	377.881	0.29	8.299
0.028	377.779	0.307	8.529

0.023	377.69	0.32	8.769
0.017	377.566	0.34	9.014
0.012	377.482	0.353	9.255

GarnetEcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.215	381.385	0.79	0
0.21	381.277	0.771	0.167
0.2	381.082	0.729	0.242
0.19	380.892	0.695	0.349
0.188	380.863	0.688	0.929
0.183	380.77	0.671	1.051
0.19	380.893	0.695	1.182
0.181	380.726	0.661	1.316
0.186	380.828	0.683	1.446
0.171	380.54	0.626	1.587
0.174	380.588	0.634	1.72
0.169	380.496	0.612	1.867
0.165	380.41	0.598	2.007
0.165	380.411	0.596	2.145
0.151	380.144	0.547	2.296
0.144	380.01	0.519	2.422
0.151	380.155	0.549	2.56
0.141	379.967	0.513	2.735
0.135	379.843	0.491	3
0.131	379.768	0.475	3.14
0.125	379.651	0.454	3.281
0.119	379.541	0.434	3.417
0.113	379.423	0.411	3.536
0.1	379.173	0.367	3.684
0.097	379.115	0.355	3.818
0.093	379.038	0.343	3.958
0.085	378.876	0.315	4.099
0.078	378.741	0.296	4.238
0.075	378.698	0.289	4.382
0.068	378.561	0.274	4.533
0.065	378.498	0.266	4.666
0.056	378.331	0.261	4.803
0.047	378.148	0.263	4.945
0.046	378.127	0.264	5.087
0.041	378.041	0.272	5.229
0.04	378.019	0.274	5.37
0.036	377.939	0.282	5.512
0.031	377.84	0.296	5.655
0.03	377.821	0.299	5.79
0.025	377.738	0.312	5.935
0.024	377.714	0.314	6.076
0.02	377.626	0.329	6.261
0.017	377.581	0.337	6.412
0.014	377.508	0.347	6.534
0.012	377.472	0.355	6.683

GarnetEcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.215	381.385	0.792	0
0.203	381.141	0.745	0.145
0.215	381.383	0.795	0.2
0.2	381.1	0.739	0.317
0.206	381.199	0.759	0.377
0.19	380.898	0.697	0.45
0.198	381.054	0.728	0.615
0.193	380.949	0.708	0.728
0.188	380.868	0.692	0.855
0.192	380.943	0.706	1.002
0.185	380.812	0.68	1.163
0.18	380.701	0.655	1.28
0.184	380.775	0.669	1.405
0.171	380.535	0.625	1.544
0.171	380.538	0.624	1.689
0.141	379.95	0.512	1.822
0.142	379.984	0.514	2.106
0.141	379.962	0.511	2.242
0.145	380.03	0.528	2.385
0.136	379.857	0.493	2.521
0.133	379.813	0.483	2.661
0.128	379.71	0.464	2.798
0.122	379.588	0.442	2.943
0.113	379.421	0.409	3.084
0.11	379.367	0.399	3.221
0.104	379.244	0.376	3.362
0.101	379.185	0.367	3.441
0.093	379.04	0.343	3.591
0.09	378.987	0.333	3.731
0.086	378.898	0.32	3.861
0.079	378.762	0.299	4.004
0.068	378.562	0.273	4.141
0.063	378.46	0.263	4.28
0.057	378.346	0.26	4.427
0.053	378.26	0.26	4.559
0.037	377.957	0.28	4.852
0.036	377.931	0.283	4.98
0.033	377.873	0.29	5.121
0.027	377.769	0.305	5.283

GarnetFcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.219	381.459	0.812	0
0.209	381.267	0.771	0.199

0.214	381.367	0.789	0.336
0.21	381.278	0.773	0.481
0.205	381.18	0.754	0.62
0.207	381.217	0.759	0.808
0.197	381.042	0.721	1.015
0.175	380.615	0.638	1.277
0.212	381.325	0.783	1.434
0.202	381.13	0.744	1.617
0.19	380.904	0.698	1.834
0.199	381.066	0.731	3.385
0.211	381.307	0.781	3.574
0.213	381.345	0.785	3.802
0.206	381.215	0.759	4.065
0.204	381.164	0.748	4.221
0.2	381.084	0.734	4.358
0.196	381.011	0.72	4.619
0.188	380.857	0.688	4.842
0.188	380.859	0.689	5.06
0.178	380.675	0.651	5.267
0.161	380.336	0.586	5.456
0.136	379.853	0.495	5.664
0.132	379.788	0.48	5.729
0.149	380.105	0.538	6.094
0.136	379.866	0.493	6.351
0.12	379.551	0.435	6.598
0.114	379.442	0.413	6.776
0.1	379.166	0.365	7
0.103	379.219	0.374	7.072
0.085	378.873	0.314	7.481
0.089	378.95	0.327	7.619
0.081	378.813	0.307	7.994
0.08	378.793	0.303	8.319
0.059	378.385	0.261	8.549
0.038	377.983	0.277	8.734
0.034	377.91	0.285	8.947
0.031	377.845	0.296	9.182
0.029	377.808	0.303	9.353
0.024	377.708	0.315	9.484
0.019	377.609	0.331	9.616
0.017	377.58	0.336	9.718
0.013	377.499	0.351	9.8
0.012	377.483	0.354	9.869
0.011	377.461	0.356	9.923
0.009	377.417	0.366	9.981
0.008	377.398	0.367	10.049
0.008	377.393	0.37	10.118
0.007	377.377	0.374	10.19
0.006	377.371	0.373	10.265
0.006	377.363	0.374	10.316
0.006	377.362	0.375	10.373
0.006	377.359	0.375	10.404
0.007	377.378	0.374	10.515
0.006	377.371	0.372	10.878

GarnetFcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.207	381.225	0.763	0.777
0.198	381.055	0.724	0.83
0.198	381.052	0.724	1.076
0.196	381.018	0.72	1.281
0.199	381.071	0.73	1.39
0.204	381.167	0.751	1.524
0.196	381.024	0.72	1.619
0.194	380.985	0.708	1.774
0.177	380.655	0.646	1.962
0.171	380.541	0.625	2.092
0.177	380.651	0.648	2.264
0.173	380.564	0.631	2.476
0.163	380.378	0.592	2.748
0.165	380.412	0.595	3.035
0.16	380.332	0.582	3.326
0.148	380.091	0.537	3.624
0.144	380.023	0.524	4.032
0.128	379.703	0.463	4.321
0.126	379.662	0.451	4.513
0.11	379.363	0.398	4.81
0.108	379.324	0.392	5.004
0.093	379.037	0.342	5.261
0.085	378.884	0.318	5.597
0.075	378.691	0.288	5.865
0.061	378.419	0.262	6.303
0.049	378.183	0.262	6.736
0.035	377.925	0.284	7.082
0.03	377.824	0.3	7.386
0.022	377.667	0.324	7.591
0.008	377.409	0.366	7.95
0.006	377.357	0.376	8.111
0.006	377.365	0.374	8.223
0.007	377.38	0.373	8.305
0.005	377.35	0.377	8.367
0.006	377.358	0.375	8.508
0.005	377.34	0.378	8.636
0.005	377.353	0.379	8.765
0.007	377.375	0.372	8.765

GarnetHcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.121	379.576	0.44	0
0.114	379.43	0.412	0.156
0.117	379.502	0.426	0.289

0.119	379.536	0.432	0.442
0.118	379.521	0.428	0.593
0.113	379.426	0.409	0.74
0.114	379.447	0.413	0.905
0.111	379.377	0.4	1.024
0.112	379.408	0.408	1.17
0.1	379.16	0.362	1.331
0.102	379.216	0.374	1.471
0.094	379.055	0.345	1.609
0.083	378.846	0.311	1.919
0.079	378.769	0.301	2.037
0.071	378.605	0.276	2.199
0.073	378.651	0.283	2.33
0.061	378.428	0.262	2.512
0.056	378.325	0.26	2.635
0.048	378.175	0.261	2.778
0.049	378.189	0.262	2.933
0.044	378.094	0.267	3.058
0.041	378.031	0.273	3.211
0.036	377.931	0.283	3.365
0.033	377.883	0.29	3.489
0.028	377.784	0.305	3.635
0.027	377.772	0.306	3.78
0.021	377.65	0.327	3.951
0.02	377.634	0.327	4.066
0.015	377.541	0.346	4.207
0.013	377.492	0.351	4.348
0.01	377.445	0.36	4.495
0.01	377.434	0.362	4.651
0.006	377.365	0.374	4.779
0.006	377.362	0.377	4.915
0.006	377.357	0.374	5.066
0.006	377.365	0.374	5.227
0.004	377.319	0.381	5.342
0.005	377.352	0.376	5.507
0.006	377.358	0.375	5.563

GarnetHcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.116	379.473	0.419	0.888
0.119	379.526	0.43	0.939
0.114	379.438	0.413	0.954
0.095	379.071	0.348	1.167
0.093	379.028	0.339	1.352
0.084	378.867	0.314	1.527
0.08	378.788	0.303	1.798
0.075	378.697	0.288	2.066
0.076	378.701	0.289	2.26
0.065	378.488	0.267	2.61
0.051	378.232	0.261	3.037
0.044	378.095	0.267	3.283
0.032	377.869	0.292	3.625
0.022	377.662	0.324	3.867
0.012	377.483	0.354	4.185
0.008	377.407	0.367	4.427
0.006	377.365	0.375	4.63
0.008	377.41	0.367	4.77

GarnetIcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.181	380.718	0.658	0
0.179	380.697	0.659	0.133
0.166	380.434	0.606	0.264
0.163	380.379	0.592	0.488
0.154	380.204	0.559	0.645
0.15	380.132	0.544	1.031
0.138	379.891	0.496	1.136
0.136	379.857	0.494	1.365
0.154	380.209	0.561	1.626
0.151	380.156	0.55	1.856
0.148	380.085	0.533	2.084
0.144	380.011	0.522	2.272
0.14	379.937	0.505	2.557
0.145	380.03	0.524	2.775
0.129	379.727	0.467	3.026
0.135	379.837	0.487	3.236
0.12	379.557	0.434	3.481
0.128	379.7	0.461	3.738
0.123	379.607	0.444	3.942
0.124	379.626	0.445	4.112
0.121	379.567	0.436	4.376
0.114	379.443	0.416	4.597
0.104	379.25	0.381	4.83
0.095	379.066	0.348	5.013
0.089	378.96	0.332	5.22
0.075	378.685	0.286	5.58
0.07	378.595	0.277	5.738
0.065	378.492	0.267	5.996
0.056	378.323	0.26	6.187
0.05	378.205	0.26	6.425
0.043	378.073	0.269	6.635
0.037	377.963	0.28	6.845
0.03	377.818	0.301	7.069
0.026	377.741	0.313	7.305
0.021	377.657	0.325	7.559
0.016	377.563	0.34	7.791
0.013	377.493	0.352	8.014
0.011	377.467	0.356	8.245
0.008	377.395	0.37	8.481
0.007	377.39	0.372	8.669

0.006	377.361	0.376	8.903
0.006	377.357	0.377	9.111
0.007	377.374	0.373	9.249

GarnetJcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.077	378.726	0.292	0
0.074	378.673	0.285	0.077
0.072	378.625	0.278	0.104
0.071	378.611	0.28	0.143
0.071	378.607	0.277	0.157
0.07	378.585	0.275	0.193
0.072	378.625	0.279	0.263
0.064	378.484	0.266	0.286
0.069	378.57	0.274	0.339
0.063	378.466	0.264	0.35
0.066	378.522	0.27	0.411
0.063	378.459	0.264	0.421
0.059	378.388	0.261	0.495
0.055	378.302	0.26	0.561
0.051	378.233	0.26	0.731
0.047	378.156	0.263	0.801
0.041	378.039	0.272	0.875
0.039	378	0.274	0.942
0.037	377.957	0.279	1.011
0.035	377.916	0.284	1.077
0.022	377.669	0.323	1.149
0.019	377.622	0.331	1.188
0.014	377.524	0.346	1.286
0.012	377.469	0.356	1.383

GarnetJcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.055	378.31	0.259	0.476
0.053	378.268	0.26	0.549
0.054	378.281	0.26	0.622
0.055	378.299	0.259	0.712
0.051	378.237	0.261	0.774
0.042	378.063	0.269	0.979
0.042	378.051	0.271	1.048
0.037	377.961	0.28	1.192
0.031	377.846	0.295	1.266
0.031	377.847	0.293	1.337
0.028	377.791	0.303	1.407
0.027	377.773	0.307	1.477
0.025	377.724	0.312	1.548
0.025	377.719	0.315	1.618
0.022	377.662	0.326	1.687
0.022	377.669	0.322	1.759
0.019	377.609	0.332	1.829
0.019	377.614	0.333	1.9
0.016	377.553	0.342	1.968
0.016	377.552	0.342	2.038
0.012	377.47	0.355	2.114
0.011	377.453	0.36	2.179
0.01	377.439	0.36	2.248
0.008	377.405	0.368	2.319
0.007	377.386	0.369	2.391
0.007	377.38	0.373	2.458
0.005	377.35	0.375	2.527
0.006	377.359	0.377	2.599
0.005	377.345	0.378	2.664

GarnetJcurve3

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.053	378.272	0.26	0.956
0.055	378.299	0.26	0.973
0.052	378.255	0.26	1.026
0.051	378.229	0.26	1.033
0.051	378.223	0.26	1.085
0.047	378.145	0.263	1.112
0.042	378.05	0.269	1.216
0.036	377.941	0.283	1.382
0.035	377.928	0.283	1.414
0.032	377.861	0.293	1.492
0.031	377.84	0.295	1.552
0.028	377.792	0.303	1.622
0.027	377.765	0.306	1.682
0.025	377.73	0.313	1.747
0.019	377.616	0.33	1.822
0.016	377.546	0.344	1.888
0.012	377.469	0.355	2.028
0.011	377.452	0.357	2.181
0.007	377.379	0.37	2.319
0.008	377.407	0.365	2.375
0.008	377.403	0.369	2.457
0.008	377.397	0.37	2.508

GarnetJcurve4

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.053	378.259	0.259	0.625
0.051	378.229	0.26	0.628
0.051	378.235	0.26	0.639
0.05	378.206	0.262	0.66
0.053	378.258	0.26	0.674
0.05	378.207	0.26	0.687

0.055	378.301	0.26	0.692
0.047	378.151	0.263	0.719
0.054	378.285	0.26	0.72
0.046	378.128	0.264	0.743
0.051	378.236	0.26	0.755
0.04	378.025	0.273	0.874
0.033	377.886	0.288	1.002
0.028	377.778	0.306	1.125
0.026	377.754	0.308	1.2
0.024	377.703	0.317	1.275
0.023	377.692	0.319	1.315
0.019	377.62	0.329	1.364
0.019	377.622	0.33	1.435
0.016	377.563	0.339	1.502
0.014	377.525	0.347	1.567
0.014	377.516	0.347	1.634
0.011	377.464	0.355	1.7
0.009	377.425	0.364	1.773
0.008	377.409	0.367	1.84
0.009	377.412	0.365	1.91
0.008	377.395	0.368	1.977
0.006	377.367	0.374	2.046
0.007	377.378	0.372	2.115
0.008	377.403	0.369	2.184
0.006	377.37	0.374	2.264
0.006	377.36	0.377	2.331
0.005	377.353	0.376	2.401
0.006	377.355	0.378	2.476
0.006	377.353	0.378	2.537
0.006	377.367	0.376	2.608
0.007	377.374	0.373	2.682

GarnetKcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.226	381.585	0.832	0
0.218	381.43	0.804	0.064
0.217	381.41	0.8	0.14
0.215	381.373	0.792	0.247
0.213	381.348	0.785	0.333
0.22	381.474	0.812	0.368
0.212	381.321	0.782	0.413
0.214	381.363	0.787	0.52
0.213	381.335	0.786	0.579
0.221	381.493	0.819	0.644
0.21	381.283	0.773	0.725
0.208	381.241	0.765	0.735
0.219	381.455	0.81	0.923
0.221	381.5	0.819	0.93
0.206	381.205	0.757	0.994
0.201	381.112	0.738	1.106
0.209	381.26	0.772	1.106
0.218	381.43	0.805	1.169
0.22	381.478	0.811	1.299
0.209	381.257	0.768	1.339
0.205	381.189	0.755	1.581
0.204	381.178	0.752	1.811
0.196	381.008	0.718	2.023
0.19	380.909	0.699	2.213
0.192	380.941	0.706	2.302
0.188	380.859	0.688	2.517
0.177	380.643	0.648	2.714
0.178	380.665	0.651	2.879
0.166	380.439	0.607	3.095
0.166	380.44	0.608	3.278
0.151	380.156	0.55	3.517
0.148	380.095	0.536	3.633
0.136	379.862	0.49	3.845
0.136	379.855	0.489	4.019
0.125	379.641	0.452	4.218
0.119	379.527	0.432	4.419
0.11	379.364	0.4	4.562
0.1	379.176	0.367	4.746
0.093	379.032	0.342	4.931
0.074	378.666	0.285	5.183
0.065	378.501	0.267	5.341
0.058	378.359	0.261	5.487
0.056	378.327	0.259	5.699
0.051	378.218	0.26	5.813
0.045	378.106	0.266	5.97
0.038	377.977	0.279	6.086
0.03	377.826	0.3	6.251
0.021	377.654	0.325	6.549
0.02	377.64	0.326	6.648
0.015	377.542	0.344	6.806
0.012	377.48	0.356	6.935
0.009	377.43	0.363	7.152
0.007	377.386	0.37	7.331
0.007	377.373	0.375	7.485
0.006	377.356	0.375	7.676
0.007	377.376	0.372	7.721

GarnetKcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.223	381.526	0.822	0.29
0.215	381.379	0.792	0.372
0.213	381.346	0.785	0.399
0.213	381.34	0.783	0.559
0.214	381.367	0.796	0.566
0.207	381.219	0.762	0.653
0.217	381.411	0.801	0.807

0.188	380.862	0.691	0.916
0.183	380.767	0.67	0.981
0.18	380.711	0.659	1.055
0.177	380.655	0.652	1.168

GarnetLcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.237	381.794	0.878	0
0.235	381.76	0.871	0.18
0.23	381.663	0.853	0.238
0.221	381.494	0.82	0.371
0.222	381.513	0.817	0.489
0.223	381.543	0.83	0.599
0.22	381.474	0.815	0.912
0.212	381.32	0.784	1.07
0.211	381.294	0.775	1.32
0.213	381.339	0.781	1.437
0.21	381.289	0.779	1.621
0.208	381.25	0.767	1.793
0.205	381.184	0.753	1.999
0.199	381.07	0.733	2.171
0.194	380.97	0.711	2.446
0.189	380.883	0.691	2.708
0.191	380.911	0.699	2.84
0.186	380.815	0.68	3.026
0.182	380.755	0.666	3.188
0.182	380.741	0.668	3.348
0.175	380.614	0.638	3.472
0.174	380.6	0.636	3.64
0.161	380.341	0.584	3.964
0.15	380.14	0.548	4.164
0.142	379.982	0.512	4.299
0.133	379.797	0.483	4.509
0.123	379.62	0.446	4.659
0.115	379.464	0.418	4.819
0.108	379.323	0.394	4.92
0.1	379.177	0.366	5.095
0.09	378.969	0.331	5.25
0.071	378.617	0.278	5.45
0.06	378.409	0.261	5.628
0.04	378.023	0.273	5.935
0.031	377.84	0.296	6.172
0.03	377.826	0.297	6.311
0.023	377.68	0.321	6.48
0.016	377.563	0.341	6.64
0.012	377.478	0.355	6.827
0.007	377.384	0.37	7.044
0.006	377.362	0.375	7.204
0.006	377.356	0.376	7.34
0.007	377.385	0.371	7.481

GarnetLcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.237	381.794	0.882	0
0.236	381.791	0.88	0.09
0.23	381.671	0.856	0.398
0.234	381.745	0.868	0.738
0.216	381.4	0.801	1.347
0.229	381.654	0.851	1.565
0.196	381.024	0.72	1.957
0.177	380.647	0.647	2.263
0.203	381.153	0.748	2.538
0.192	380.935	0.705	2.78
0.182	380.737	0.664	3.006
0.164	380.395	0.597	3.326
0.134	379.815	0.482	4.327
0.129	379.733	0.467	4.661
0.114	379.43	0.411	4.989
0.104	379.256	0.382	5.411
0.069	378.577	0.275	5.778
0.066	378.512	0.268	6.041
0.026	377.745	0.31	6.221

GarnetMcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.202	381.134	0.743	0
0.197	381.037	0.723	0.077
0.2	381.099	0.741	0.106
0.206	381.199	0.758	0.302
0.197	381.043	0.723	0.321
0.206	381.214	0.757	0.499
0.193	380.958	0.71	0.513
0.198	381.051	0.729	0.726
0.197	381.041	0.727	0.93
0.191	380.918	0.702	1.145
0.191	380.919	0.7	1.361
0.193	380.948	0.705	1.554
0.182	380.738	0.666	1.762
0.177	380.657	0.646	1.963
0.169	380.486	0.616	2.157
0.157	380.258	0.573	2.373
0.159	380.311	0.582	2.558
0.156	380.245	0.566	2.77
0.143	379.989	0.515	2.987
0.142	379.97	0.513	3.186
0.116	379.475	0.42	3.402
0.123	379.609	0.443	3.615
0.121	379.565	0.438	3.827

0.118	379.506	0.425	4.026
0.104	379.246	0.379	4.214
0.096	379.102	0.352	4.42
0.088	378.936	0.327	4.623
0.082	378.826	0.307	4.838
0.07	378.598	0.277	5.042
0.063	378.461	0.265	5.202
0.045	378.115	0.265	5.663
0.037	377.959	0.28	5.87
0.033	377.884	0.289	6.064
0.026	377.743	0.312	6.312
0.022	377.665	0.322	6.476
0.015	377.535	0.343	6.691
0.012	377.482	0.352	6.894
0.009	377.415	0.364	7.085
0.005	377.347	0.377	7.291
0.006	377.355	0.378	7.503
0.006	377.366	0.375	7.722

GarnetMcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.202	381.134	0.742	0
0.205	381.193	0.757	0.302
0.204	381.177	0.749	0.499
0.2	381.083	0.735	0.891
0.199	381.07	0.73	1.22
0.191	380.917	0.7	1.47
0.189	380.884	0.689	1.753
0.185	380.809	0.679	1.975
0.184	380.793	0.675	2.119
0.173	380.581	0.63	2.47
0.181	380.723	0.661	2.648
0.178	380.678	0.651	2.932
0.142	379.971	0.513	3.127
0.123	379.616	0.447	4.802

GarnetNcurve1

XMn	Age (Ma)	Age Uncert.	Dist. fr. core (mm)
0.249	382.036	0.932	0
0.243	381.924	0.905	0.247
0.24	381.869	0.9	0.554
0.19	380.892	0.695	0.794
0.181	380.718	0.655	0.945
0.171	380.535	0.624	1.3
0.144	380.015	0.521	1.878
0.151	380.157	0.551	1.998
0.179	380.695	0.656	2.509
0.159	380.307	0.581	2.737
0.167	380.462	0.609	2.972
0.19	380.909	0.7	3.277
0.198	381.046	0.724	3.541
0.191	380.913	0.701	3.78
0.189	380.889	0.691	4.063
0.187	380.85	0.684	4.269
0.177	380.643	0.644	4.424
0.172	380.549	0.63	4.759
0.17	380.514	0.619	5.009
0.152	380.165	0.551	5.201
0.153	380.198	0.559	5.509
0.153	380.185	0.553	5.741
0.137	379.879	0.499	6.005
0.131	379.767	0.477	6.223
0.102	379.211	0.372	6.472
0.092	379.021	0.339	6.806
0.085	378.879	0.316	7.026
0.07	378.586	0.276	7.18
0.051	378.22	0.26	7.948
0.044	378.092	0.266	8.251
0.038	377.986	0.275	8.468
0.033	377.873	0.29	8.736
0.025	377.729	0.314	8.968
0.021	377.657	0.323	9.162
0.02	377.642	0.326	9.247
0.015	377.527	0.345	9.46
0.011	377.459	0.356	9.678
0.01	377.43	0.361	9.864
0.007	377.383	0.371	10.007

GarnetQcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.167	380.461	0.61	0
0.148	380.095	0.537	0.191
0.161	380.338	0.583	0.259
0.154	380.203	0.557	0.266
0.155	380.222	0.56	0.458
0.158	380.289	0.576	0.474
0.135	379.834	0.486	0.751
0.14	379.943	0.509	0.981
0.128	379.709	0.461	1.224
0.11	379.368	0.402	1.505
0.093	379.039	0.343	1.766
0.077	378.728	0.293	1.981
0.066	378.509	0.269	2.238
0.043	378.078	0.269	2.79
0.038	377.984	0.278	2.984
0.032	377.862	0.292	3.229
0.023	377.685	0.32	3.474
0.019	377.617	0.331	3.732

0.01	377.447	0.359	3.97
0.01	377.437	0.361	4.118
0.008	377.404	0.368	4.379
0.007	377.374	0.373	4.505
0.006	377.364	0.374	4.69
0.007	377.388	0.369	4.893

GarnetQcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.167	380.461	0.611	0
0.164	380.397	0.599	0.35
0.154	380.2	0.56	0.364
0.134	379.827	0.486	0.742
0.133	379.81	0.483	0.794
0.131	379.764	0.474	0.926
0.119	379.537	0.432	1.244
0.113	379.421	0.411	1.401
0.107	379.296	0.387	1.634
0.097	379.118	0.358	1.82
0.087	378.919	0.323	2.128
0.069	378.575	0.274	2.352
0.06	378.407	0.262	2.599
0.048	378.171	0.261	2.853
0.04	378.01	0.274	3.132
0.036	377.947	0.282	3.253

GarnetRcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.054	378.281	0.26	0
0.048	378.169	0.262	0.182
0.036	377.931	0.284	0.537
0.034	377.901	0.287	0.626
0.03	377.827	0.298	0.839
0.023	377.693	0.319	1.017
0.013	377.495	0.351	1.39
0.012	377.481	0.354	1.476
0.008	377.401	0.366	1.748
0.007	377.39	0.369	1.983
0.007	377.373	0.372	2.1

GarnetRcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.054	378.281	0.259	0
0.053	378.259	0.258	0.253
0.048	378.164	0.263	0.457
0.039	378.005	0.275	0.686
0.036	377.935	0.281	0.83
0.031	377.846	0.293	1.101
0.026	377.748	0.31	1.306
0.022	377.677	0.321	1.472
0.015	377.53	0.346	1.713
0.009	377.427	0.365	2.105

GarnetRcurve3

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.049	378.188	0.262	0.305
0.048	378.174	0.262	0.341
0.043	378.08	0.268	0.443
0.037	377.967	0.279	0.71
0.032	377.854	0.294	0.888
0.019	377.616	0.331	1.171
0.013	377.507	0.351	1.462
0.009	377.422	0.365	1.686
0.007	377.389	0.37	1.851
0.006	377.372	0.374	1.993
0.005	377.352	0.377	2.13
0.005	377.341	0.379	2.288
0.007	377.374	0.372	2.338

GarnetScurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.047	378.149	0.263	0
0.042	378.055	0.271	0.132
0.043	378.066	0.269	0.159
0.046	378.126	0.265	0.295
0.041	378.038	0.272	0.335
0.036	377.946	0.279	0.514
0.033	377.887	0.289	0.67
0.04	378.013	0.274	0.691
0.032	377.861	0.293	0.85
0.025	377.732	0.312	1.004
0.024	377.705	0.316	1.028
0.022	377.667	0.323	1.228
0.019	377.611	0.33	1.489
0.018	377.587	0.336	1.543
0.016	377.551	0.343	1.712
0.011	377.461	0.358	1.882
0.01	377.447	0.361	2.054
0.007	377.376	0.374	2.122
0.007	377.388	0.369	2.201

GarnetScurve2

XMn	Age (Ma)	Age Uncert.	Distance from core

			(mm)
0.043	378.069	0.27	0.422
0.044	378.087	0.267	0.445
0.041	378.039	0.272	0.524
0.038	377.982	0.276	0.621
0.033	377.881	0.29	0.692
0.032	377.868	0.291	0.813
0.025	377.723	0.311	1.005
0.023	377.691	0.319	1.07
0.022	377.671	0.322	1.137
0.02	377.627	0.33	1.208
0.016	377.559	0.342	1.276
0.013	377.499	0.351	1.388
0.011	377.459	0.358	1.405

GarnetVcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.083	378.85	0.311	0.504
0.081	378.81	0.305	0.583
0.079	378.761	0.297	0.695
0.07	378.601	0.277	0.868
0.069	378.565	0.273	0.971
0.068	378.549	0.272	1.107
0.065	378.494	0.267	1.217
0.059	378.388	0.261	1.342
0.058	378.369	0.26	1.428
0.057	378.336	0.261	1.569
0.051	378.236	0.261	1.665
0.046	378.13	0.264	1.842
0.043	378.078	0.268	2.097
0.037	377.96	0.281	2.17
0.038	377.97	0.279	2.29
0.035	377.911	0.285	2.39
0.03	377.82	0.298	2.51
0.028	377.79	0.304	2.617
0.023	377.688	0.319	2.779
0.022	377.671	0.322	2.879
0.018	377.6	0.334	3.003
0.018	377.594	0.335	3.092
0.018	377.596	0.333	3.218
0.014	377.521	0.348	3.326
0.014	377.51	0.348	3.48
0.012	377.486	0.356	3.591
0.01	377.435	0.363	3.705
0.009	377.426	0.365	3.735
0.008	377.396	0.37	3.783
0.009	377.413	0.369	3.825
0.009	377.415	0.366	3.872
0.009	377.419	0.366	3.942
0.007	377.376	0.372	4.054
0.005	377.35	0.378	4.121
0.005	377.336	0.378	4.174
0.005	377.342	0.376	4.226
0.006	377.362	0.376	4.382
0.005	377.342	0.378	4.422
0.004	377.33	0.38	4.453
0.005	377.344	0.377	4.498
0.006	377.362	0.375	4.526

GarnetVcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.094	379.064	0.348	0
0.094	379.045	0.343	0.184
0.091	379.005	0.336	0.451
0.093	379.038	0.343	0.703
0.083	378.851	0.311	0.875
0.075	378.695	0.289	1.04
0.071	378.62	0.28	1.195
0.063	378.45	0.263	1.387
0.05	378.21	0.261	1.743
0.048	378.167	0.263	1.968
0.037	377.968	0.279	2.139
0.032	377.854	0.294	2.409
0.024	377.711	0.315	2.618
0.02	377.625	0.329	2.83
0.011	377.453	0.358	3.123
0.011	377.449	0.359	3.177
0.01	377.432	0.362	3.235
0.009	377.426	0.364	3.341
0.007	377.391	0.369	3.427
0.007	377.387	0.371	3.428
0.007	377.379	0.371	3.602
0.005	377.346	0.377	3.699
0.007	377.383	0.371	3.808

GarnetWcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.035	377.924	0.285	0
0.033	377.878	0.29	0.059
0.028	377.782	0.304	0.116
0.032	377.858	0.291	0.293
0.022	377.664	0.324	0.556
0.015	377.544	0.343	0.732
0.013	377.499	0.352	0.859
0.006	377.371	0.374	1.142
0.007	377.387	0.371	1.24

GarnetWcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.035	377.924	0.283	0
0.03	377.815	0.299	0.169
0.022	377.677	0.321	0.342
0.019	377.622	0.329	0.437
0.015	377.543	0.345	0.544
0.012	377.479	0.355	0.651
0.011	377.459	0.359	0.749
0.007	377.387	0.371	0.855
0.007	377.376	0.373	0.965
0.006	377.363	0.373	1.095
0.006	377.36	0.375	1.185
0.007	377.387	0.37	1.283
0.007	377.373	0.373	1.368
0.007	377.379	0.37	1.417

GarnetWcurve3

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.035	377.924	0.285	0
0.03	377.824	0.298	0.154
0.033	377.88	0.29	0.176
0.03	377.828	0.298	0.291
0.023	377.695	0.317	0.392
0.016	377.56	0.338	0.485
0.013	377.488	0.353	0.595
0.011	377.469	0.357	0.724
0.008	377.41	0.368	0.809
0.008	377.399	0.368	0.882
0.007	377.383	0.37	0.972
0.007	377.385	0.37	1.047

GarnetXcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.234	381.752	0.873	0
0.236	381.789	0.88	0.254
0.229	381.659	0.849	0.515
0.227	381.616	0.845	0.749
0.226	381.601	0.836	0.994
0.232	381.713	0.861	1.354
0.219	381.457	0.81	1.536
0.217	381.415	0.802	1.741
0.208	381.253	0.766	2.077
0.214	381.36	0.792	2.249
0.211	381.304	0.777	2.514
0.204	381.178	0.752	2.753
0.208	381.246	0.765	3.01
0.202	381.139	0.747	3.238
0.2	381.093	0.738	3.504
0.202	381.128	0.746	3.754
0.196	381.01	0.72	4.011
0.192	380.937	0.705	4.217
0.181	380.728	0.659	4.481
0.183	380.76	0.668	4.761
0.173	380.581	0.634	4.994
0.161	380.333	0.58	5.292
0.158	380.282	0.572	5.483
0.155	380.226	0.566	5.769
0.144	380.007	0.519	6.023
0.14	379.941	0.507	6.24
0.132	379.785	0.479	6.489
0.123	379.603	0.442	6.741
0.114	379.431	0.411	6.98
0.105	379.265	0.381	7.248
0.096	379.092	0.349	7.498
0.085	378.875	0.316	7.76
0.08	378.777	0.299	7.989
0.077	378.727	0.293	8.225
0.065	378.505	0.269	8.481
0.052	378.252	0.259	8.781
0.03	377.819	0.298	9.114
0.007	377.382	0.37	9.295
0.007	377.384	0.37	9.323
0.007	377.379	0.371	9.325
0.007	377.384	0.373	9.329
0.01	377.432	0.363	9.33

GarnetXcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.23	381.676	0.855	1.151
0.228	381.63	0.847	1.243
0.234	381.744	0.868	1.38
0.223	381.536	0.829	1.552
0.224	381.544	0.824	1.736
0.225	381.574	0.834	1.917
0.22	381.482	0.814	2.107
0.223	381.527	0.822	2.308
0.23	381.674	0.856	2.54
0.215	381.389	0.797	2.695
0.225	381.571	0.837	2.913
0.217	381.424	0.804	3.177
0.215	381.376	0.793	3.337
0.225	381.571	0.833	3.615
0.215	381.379	0.793	3.843
0.212	381.323	0.779	4.012
0.206	381.21	0.755	4.245
0.203	381.151	0.748	4.45

0.199	381.068	0.732	4.64
0.198	381.049	0.726	4.897
0.175	380.617	0.644	5.107
0.132	379.783	0.479	5.426
0.182	380.755	0.668	5.597
0.181	380.724	0.66	5.892
0.178	380.664	0.648	5.983
0.137	379.887	0.497	6.194
0.104	379.248	0.378	6.534
0.032	377.859	0.294	7.321
0.036	377.931	0.284	7.522
0.049	378.185	0.261	7.821
0.049	378.187	0.261	8.097
0.036	377.944	0.281	8.252
0.049	378.197	0.261	8.457
0.034	377.91	0.285	8.624
0.02	377.637	0.328	8.891
0.01	377.435	0.363	9.175
0.007	377.379	0.372	9.386
0.006	377.368	0.375	9.469
0.006	377.355	0.377	9.48
0.005	377.353	0.377	9.498
0.007	377.384	0.37	9.511

GarnetYcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.235	381.761	0.871	0
0.23	381.677	0.855	0.195
0.23	381.671	0.853	0.367
0.231	381.686	0.861	0.514
0.233	381.721	0.863	0.656
0.229	381.643	0.85	0.73
0.231	381.691	0.858	0.888
0.23	381.675	0.85	1.007
0.225	381.567	0.832	1.143
0.232	381.715	0.863	1.292
0.231	381.694	0.859	1.401
0.229	381.659	0.85	1.597
0.226	381.599	0.842	1.733
0.228	381.639	0.846	1.941
0.224	381.552	0.828	2.033
0.229	381.647	0.849	2.153
0.229	381.647	0.856	2.247
0.233	381.732	0.868	2.375
0.227	381.615	0.843	2.493
0.226	381.587	0.835	2.804
0.227	381.612	0.841	2.973
0.232	381.711	0.862	3.129
0.232	381.708	0.864	3.213
0.231	381.694	0.859	3.492
0.222	381.516	0.82	3.563
0.227	381.615	0.845	3.694
0.225	381.566	0.832	3.889
0.217	381.415	0.802	4.068
0.22	381.475	0.815	4.442
0.211	381.309	0.78	4.533
0.209	381.273	0.772	4.738
0.214	381.359	0.791	4.848
0.21	381.276	0.774	5.021
0.211	381.299	0.782	5.137
0.202	381.131	0.743	5.322
0.205	381.189	0.755	5.519
0.205	381.188	0.754	5.899
0.201	381.12	0.742	6.001
0.2	381.095	0.734	6.112
0.199	381.08	0.734	6.234
0.199	381.074	0.734	6.353
0.193	380.948	0.705	6.476
0.19	380.906	0.702	6.569
0.166	380.446	0.604	6.766

GarnetYcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.232	381.712	0.862	1.372
0.234	381.739	0.869	1.556
0.231	381.683	0.856	1.729
0.226	381.585	0.837	1.934
0.234	381.741	0.869	2.125
0.227	381.608	0.841	2.324
0.224	381.56	0.828	2.526
0.225	381.581	0.836	2.625
0.225	381.58	0.834	2.717
0.217	381.423	0.803	2.942
0.218	381.432	0.808	3.13
0.215	381.375	0.791	3.408
0.212	381.329	0.783	3.567
0.208	381.243	0.768	3.793
0.208	381.238	0.765	4
0.202	381.133	0.743	4.154
0.196	381.018	0.722	4.223
0.202	381.128	0.741	4.375
0.199	381.075	0.734	4.525
0.199	381.066	0.73	4.634
0.191	380.927	0.702	4.847
0.182	380.755	0.668	5.049
0.18	380.703	0.657	5.183
0.168	380.486	0.615	5.336
0.17	380.515	0.621	5.479
0.161	380.336	0.582	5.645
0.159	380.302	0.58	5.807

0.152	380.165	0.552	5.897
0.142	379.984	0.518	6.132
0.134	379.83	0.488	6.292
0.127	379.687	0.459	6.476
0.116	379.484	0.421	6.612
0.11	379.367	0.4	6.895
0.102	379.214	0.37	7.111
0.092	379.013	0.338	7.324
0.081	378.813	0.307	7.533
0.073	378.659	0.284	7.734
0.061	378.415	0.261	7.996
0.053	378.262	0.26	8.18
0.044	378.098	0.267	8.373
0.04	378.02	0.273	8.548
0.032	377.854	0.293	8.749
0.029	377.8	0.303	8.788
0.027	377.767	0.307	8.798
0.024	377.712	0.316	8.804
0.021	377.642	0.327	8.808

GarnetZcurve1

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.195	380.995	0.713	0
0.189	380.879	0.691	0.123
0.186	380.818	0.681	0.24
0.186	380.826	0.682	0.354
0.188	380.869	0.69	0.489
0.183	380.774	0.672	0.592
0.181	380.727	0.662	0.729
0.144	380.009	0.523	0.924
0.09	378.977	0.331	1.27
0.091	378.99	0.333	1.508
0.094	379.047	0.345	1.616
0.092	379.01	0.337	1.74
0.089	378.953	0.328	1.851
0.089	378.954	0.328	1.976
0.086	378.905	0.32	2.095
0.083	378.834	0.309	2.208
0.076	378.709	0.29	2.334
0.075	378.682	0.288	2.418
0.074	378.664	0.284	2.539
0.067	378.54	0.271	2.765
0.064	378.486	0.266	2.864
0.063	378.465	0.266	2.984
0.058	378.362	0.261	3.113
0.056	378.327	0.26	3.218
0.051	378.237	0.261	3.345
0.047	378.152	0.263	3.464
0.046	378.136	0.264	3.564
0.042	378.059	0.27	3.687
0.04	378.008	0.275	3.817
0.041	378.036	0.272	3.925
0.038	377.979	0.278	4.012
0.035	377.918	0.287	4.125
0.031	377.849	0.297	4.259
0.03	377.82	0.299	4.371
0.024	377.703	0.317	4.503
0.021	377.645	0.326	4.614
0.02	377.628	0.329	4.727
0.017	377.581	0.336	4.839
0.016	377.549	0.342	4.953
0.015	377.534	0.346	5.047
0.013	377.496	0.351	5.162
0.01	377.443	0.362	5.288
0.011	377.454	0.359	5.316
0.009	377.416	0.367	5.382
0.009	377.413	0.366	5.411
0.009	377.412	0.366	5.455
0.009	377.414	0.364	5.508
0.01	377.438	0.361	5.543
0.009	377.42	0.365	5.571
0.01	377.431	0.363	5.596
0.008	377.398	0.369	5.637
0.009	377.42	0.365	5.658
0.007	377.39	0.371	5.708
0.008	377.407	0.366	5.772
0.008	377.411	0.367	5.805
0.008	377.394	0.369	5.844
0.007	377.38	0.372	5.888

GarnetZcurve2

XMn	Age (Ma)	Age Uncert.	Distance from core (mm)
0.088	378.937	0.327	1.452
0.095	379.068	0.348	1.471
0.094	379.06	0.344	1.485
0.094	379.059	0.346	1.524
0.096	379.089	0.35	1.578
0.089	378.96	0.331	1.672
0.087	378.917	0.323	1.84
0.08	378.787	0.301	2.031
0.066	378.522	0.269	2.3
0.051	378.234	0.259	2.516
0.042	378.052	0.273	2.688
0.036	377.937	0.282	2.915
0.016	377.552	0.342	3.497
0.013	377.503	0.349	3.708
0.014	377.509	0.348	3.924
0.008	377.401	0.368	4.186
0.007	377.378	0.372	4.442
0.007	377.387	0.37	4.785

```
0.007  377.379  0.371   4.964
0.007  377.383  0.37    5.093
0.007  377.383  0.371   5.276
0.006  377.37   0.372   5.337
```

Appendix 4. Growth Curves (Digital)

Appendix 5. Ages Versus Distance (Digital)

Graphs presented include original data, culled data, and data with six degree polynomials fitted to them.

Appendix 6. HRXCT Garnet Locations

Garnets extracted for dating

Sm/Nd Dated Garnet Name	X (px)	Y (px)	Z (slice)	x (mm)	y (mm)	z (mm)
1a	283	269	138	78	74	104
1b	283	269	138	78	74	104
2	847	714	175	234	197	131
3	713	448	169	197	124	127
4	658	672	046	182	186	35
5a	498	294	095	138	81	71
5b	498	294	095	138	81	71
5c	498	294	095	138	81	71
6	295	364	291	82	101	218
7a	331	266	288	92	74	216
7b	331	266	288	92	74	216
8	323	251	254	89	69	191
9	226	532	232	63	147	174
10a	323	318	200	89	88	150
10b	323	318	200	89	88	150
11	524	241	305	145	67	229
12a	514	733	344	142	203	258
12b	514	733	344	142	203	258
13	480	719	361	133	199	271
14	181	495	367	50	137	275
15	326	510	359	90	141	269
16	220	344	445	61	95	334
17	445	287	479	123	79	359
18	719	574	414	199	159	311
19	224	335	504	62	93	378

Garnets in kinetics subvolume

Garnet Name	slice#	Unique#	CenterX (mm)	CenterY (mm)	X (pos)	Y (pos)	CenterZ (mm)	Volume (mm3)
a	181	40975372	113.456	19.639	255.076	161.259	136.321	20.198
a	186	39839316	118.731	16.521	260.351	158.141	139.862	1947.960
b	202	44377713	117.924	22.344	259.544	163.964	151.823	647.024
c	250	53405423	-43.932	-39.024	97.688	102.596	187.654	2629.180
d	260	NA	439.000	308.000	108.150	42.040	195.380	40.000
e	183	39590285	37.424	-8.839	179.044	132.781	137.443	907.992

Garnet Name	slice#	Unique#	CenterX (mm)	CenterY (mm)	X (pos)	Y (pos)	CenterZ (mm)	Volume (mm3)
f	176	36189516	92.812	-4.259	234.432	137.361	132.012	3246.600
g	186	40090045	58.362	47.772	199.982	189.392	140.187	2046.190
h	183	39976838	70.358	-82.415	211.978	59.205	137.069	685.584
i	180	36581375	93.444	-67.778	235.064	73.842	130.133	3983.830
j	183	40926560	109.535	-35.818	251.155	105.803	137.347	43.380
k	184	39101920	101.170	-45.159	242.790	96.461	138.483	1580.260
l	191	41666833	98.407	34.877	240.027	176.497	143.856	473.046
m	191	41202246	92.702	22.168	234.322	163.788	143.441	1220.140
n	180	37994574	63.321	-13.292	204.941	128.328	134.848	2890.840
o	176	38699192	33.268	14.085	174.888	155.705	131.782	402.583
p	177	38519129	32.711	63.187	174.331	204.807	133.169	1029.180
q	189	41627220	49.372	-10.573	190.992	131.047	142.241	485.211
r	203	45418971	44.294	-88.360	185.914	53.260	152.584	25.018
s	203	NA	325.000	53.000	45.090	-99.020	152.620	14.000
t	223	49382142	111.940	30.846	253.560	172.466	168.370	833.626
u	188	40275885	14.652	0.059	156.272	141.679	138.978	995.899
v	222	49151642	23.248	26.990	164.868	168.610	166.716	393.631
w	194	43903342	99.172	-5.489	240.792	136.131	145.510	8.951
x	221	46762462	57.284	-106.987	198.904	34.633	165.232	2747.390
x	221	50170660	63.129	-103.448	204.749	38.172	166.125	2.984
y	248	52880542	72.008	-116.713	213.628	24.907	187.139	2852.740
z	224	49270746	40.058	-94.558	181.678	47.062	168.509	195.783
aa	208	45497080	59.059	4.466	200.679	146.086	155.982	936.682
ab	196	43855921	52.994	-58.471	194.614	83.149	146.986	49.118
ac	189	42070740	11.641	-24.188	153.261	117.432	142.407	168.240
ad	236	52952245	55.070	-37.408	196.690	104.213	177.437	108.794
ae	192	42962802	8.348	-42.056	149.968	99.564	144.343	69.316
af	231	49267883	79.148	-98.304	220.768	43.316	172.841	3528.220
ag	221	48839327	25.253	-71.501	166.873	70.119	165.925	226.309
ah	192	41360203	4.429	-58.373	146.049	83.247	144.704	1111.810
ai	169	34768819	20.245	-66.065	161.865	75.555	126.306	3212.170
aj	186	42250326	10.787	-79.384	152.407	62.236	139.875	1.377
aj	192	40657990	13.203	-78.733	154.823	62.887	143.822	1839.170
aj	201	45657062	15.213	-76.065	156.833	65.555	151.125	1.377
ak	250	53487065	35.027	55.262	176.647	196.882	187.059	3993.010
al	251	53360151	19.820	-87.535	161.440	54.085	188.002	2674.170
am	240	54078904	-19.108	-46.115	122.513	95.505	180.195	11.476
am	241	53396692	-12.948	-46.181	128.672	95.439	181.218	181.552
an	216	48608955	3.893	-72.608	145.513	69.013	162.394	18.362
an	232	49064752	4.648	-71.493	146.268	70.127	172.286	1626.400
an	236	53606075	4.426	-68.044	146.046	73.576	177.375	1.377
ao	272	61342300	-17.231	-44.373	124.389	97.247	204.354	16.296
ap	247	53617772	2.002	-54.194	143.622	87.426	184.632	1370.480
aq	230	50436526	8.999	-58.993	150.619	82.628	172.511	687.191
ar	260	58812089	20.837	-82.703	162.457	58.917	194.750	2.754
ar	264	58589078	23.808	-80.398	165.428	61.222	198.251	210.243

Garnet Name	slice#	Unique#	CenterX (mm)	CenterY (mm)	X (pos)	Y (pos)	CenterZ (mm)	Volume (mm3)
as	257	NA	254.000	147.000	5.810	-47.020	193.120	33.000
at	280	63148926	11.053	-54.026	152.673	87.595	209.790	11.476
au	275	61534696	51.389	-83.559	193.009	58.061	206.447	93.645
av	279	59503124	34.920	-69.465	176.540	72.155	209.364	2330.570
aw	217	47054624	-22.541	-35.555	119.079	106.065	163.008	1569.020
ax	202	42729589	35.228	-47.918	176.848	93.702	151.481	2735.680
ay	208	44611330	41.852	25.484	183.472	167.104	155.635	2790.540
az	213	47325589	45.210	15.434	186.830	157.054	160.101	217.128
ba	195	41179125	-16.804	-8.005	124.816	133.615	146.948	2857.100
bb	196	43664072	16.755	-20.455	158.375	121.166	147.181	109.941
bc	228	51330181	81.283	-74.587	222.903	67.033	171.180	44.068
bd	213	44987633	74.127	-62.593	215.747	79.028	159.829	3552.780
be	290	64276650	-11.464	-60.263	130.157	81.357	217.756	601.120
bf	289	62894803	77.633	-80.733	219.253	60.887	216.527	1234.830
bf	297	67434658	74.475	-83.464	216.095	58.156	223.125	1.836
bg	204	44592724	8.834	3.225	150.454	144.845	153.321	822.380
bh	227	50007210	79.218	-32.043	220.838	109.577	170.593	351.629
bi	225	50457674	102.021	-35.753	243.641	105.867	168.891	39.707
bj	243	52978682	97.038	-6.433	238.658	135.187	182.096	1520.360
bk1	190	42709679	90.579	-72.693	232.199	68.927	142.605	20.428
bk3	195	44068281	96.987	-76.200	238.607	65.420	146.240	8.951
bl	201	41873150	35.053	10.768	176.673	152.388	150.475	3337.950
bm	195	NA	285.000	230.000	22.960	-1.110	146.620	1767.000
bn	198	41866294	23.778	-0.502	165.398	141.118	149.033	3955.590
bo	204	NA	325.000	254.000	45.090	12.170	153.380	36.000
bp	237	50716758	71.735	-1.740	213.355	139.880	177.985	4575.990
bq	259	56795809	95.241	-51.420	236.861	90.200	194.709	1053.740
br	260	56162723	12.323	3.981	153.943	145.601	194.799	2281.690
bs	273	60954867	4.926	32.464	146.546	174.084	204.433	220.342
bt	286	NA	277.000	263.000	18.530	17.150	214.880	4.190
bu	284	NA	290.000	306.000	25.720	40.940	213.380	268.000
bv	291	65020472	49.500	11.116	191.120	152.736	218.216	297.691
bw	298	66136612	95.075	-9.008	236.695	132.612	223.600	647.943
bx	289	64986411	101.971	-27.779	243.591	113.841	216.647	69.545
by	239	52053706	-17.199	-24.237	124.421	117.383	178.831	1319.300
bz	237	51841418	-22.100	-7.659	119.520	133.962	178.237	1189.620
ca	282	62686878	60.314	-63.371	201.934	78.249	211.487	242.376
cb	273	62020136	-14.660	-47.852	126.960	93.768	205.125	1.377
cc	282	62246722	68.113	-45.622	209.733	95.998	211.644	1503.140
cd	264	58156201	10.679	-54.178	152.299	87.442	198.066	516.885
ce	262	57488234	67.467	-42.995	209.087	98.625	197.281	1995.010
cf	304	66792398	46.953	-37.624	188.573	103.996	228.066	1695.030
cg	288	64729097	26.053	-62.720	167.673	78.900	216.179	81.481
ch	246	52720877	19.944	-42.326	161.564	99.295	185.436	2991.830
ci	308	68393063	59.317	-25.623	200.937	115.997	230.826	348.874
cj	301	66572686	-14.938	-30.349	126.682	111.271	225.514	617.416

Garnet Name	slice#	Unique#	CenterX (mm)	CenterY (mm)	X (pos)	Y (pos)	CenterZ (mm)	Volume (mm3)
ck	272	59755388	20.024	-39.798	161.644	101.822	204.271	1461.830
cl	299	65639243	41.457	-58.873	183.077	82.747	224.660	1023.210
cm	303	66333641	26.793	-47.636	168.413	93.984	227.446	1264.900

Appendix 7. BSE Images and EPMA Traverses (Digital)

Appendix 8. Nucleation and Growth Animation (Digital)